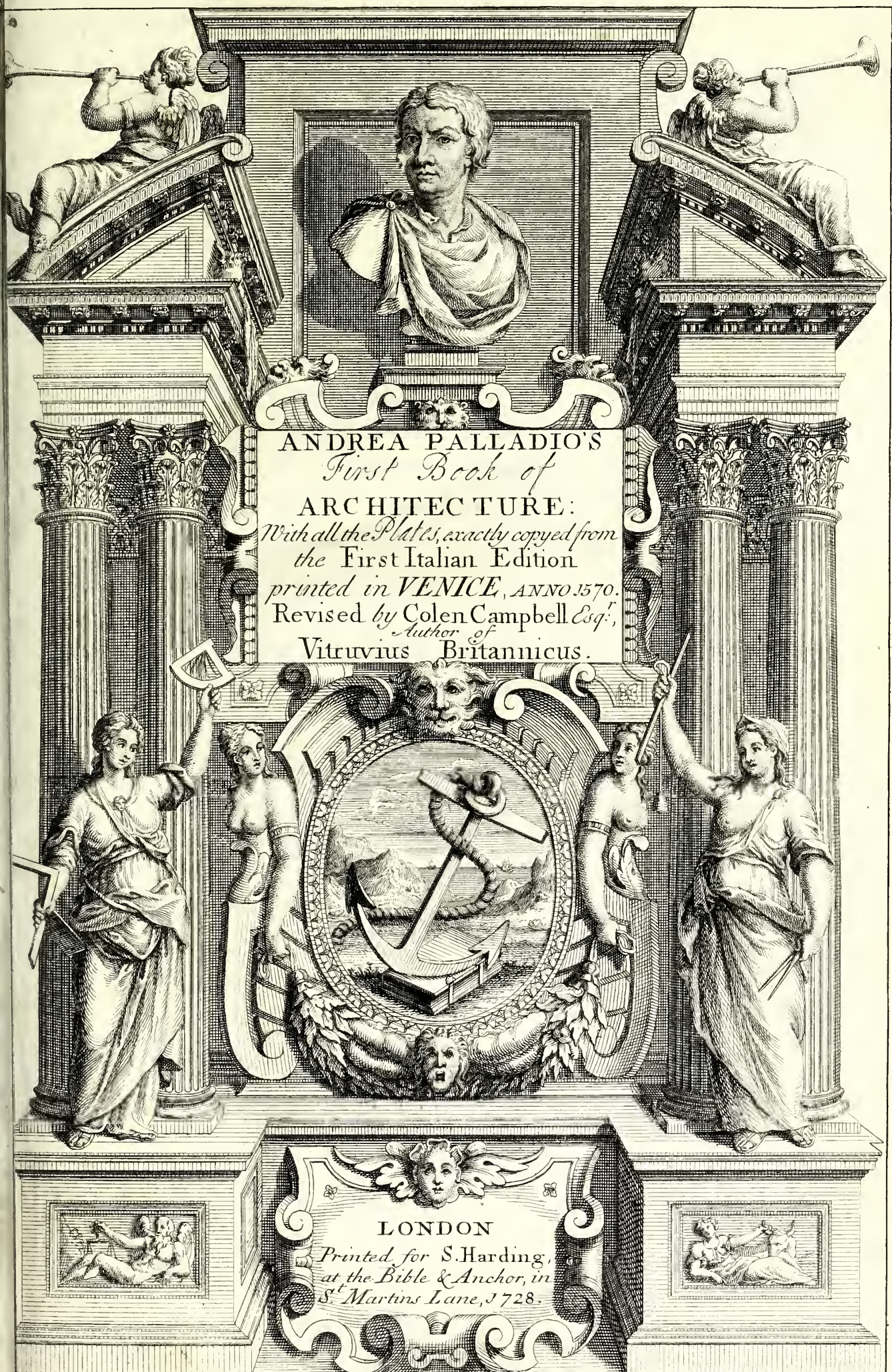




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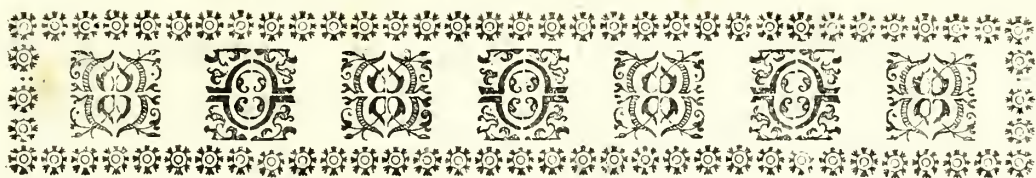
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ANDREA PALLADIO'S
First Book of
ARCHITECTURE:
With all the Plates, exactly copied from
the First Italian Edition
printed in VENICE, ANNO 1570.
Revised by Colen Campbell Esq^r,
Author of
Vitruvius Britannicus.

LONDON

Printed for S. Harding,
at the Bible & Anchor, in
S^t Martins Lane, 1728.



T H E

Author's Preface.

Y natural Inclination leading me to the
M Study of Architecture, I began from
my Youth to apply my self to that Sci-
ence; and having always been of Opi-
nion, that the Antient Romans, had not only
greatly surpassed those who are come after them
in several Arts, but also in Building, I took Vi-
truvius for my Master and Guide; he being the on-
ly antient Writer upon this Subject, whose Works
have been transmitted to us. I afterwards sought
out for all such Ruins of antient Edifices, as have
resisted the waste of Time, and the wild havock
of Barbarians; when finding them much more
worthy of Observation than I at first imagined,
I began to measure their several Members with
the utmost Accuracy and Diligence. Perceiving
afterwards that even their most minute Parts
were performed with the justest Reason, and in
a most beautiful Proportion; the Desire I had
of pursuing my Enquiries, was so much increased
thereby, that I travelled several times to diffe-
rent parts of Italy, and out of it, purposely to
find, by the Remains of antient Structures,
what the Whole must once have been, and to give

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The Author's PREFACE.

the Designs of them. When finding how much the common Method of Building, differs from the Observations I had made upon the abovementioned Edifices, and what I had read in Vitruvius, Leo Alberti, and other excellent Writers since Vitruvius's time; as well as those I my self have lately practised, with no small Applause, and to the Satisfaction of those who were pleased to employ me: I thought it an Undertaking suitable to the Nature of Man, who is not born merely for his own sake, but likewise for that of others, to publish the Designs of those Edifices, in collecting of which I have employed so many Years, and exposed my self to so many Dangers; and compendiously to set down whatever I thought most worthy of Consideration; as also those Rules I my self have always, and still make use of, in Building. My Design herein, was, to the end that all those who shall read my Books, may know how to make use of such things as may be justly laid down in them; and supply, as probably may be necessary, whatever may have been omitted. Thus, Men will learn by degrees to lay aside the extravagant Abuses, the barbarous Inventions and superfluous Expence, and what is of greater Consequence, to prevent the various and continual Ruin, to which many Fabricks have been subject. And what prompted me the more to this Undertaking, was, the great Number of Persons who at this time apply themselves to this Study; many of whom have been honourably mentioned in the Works of
Georgio

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Georgio Vafari Aretino, *that rare Painter as well as Architect; whence we may justly hope, that Building will soon be brought into such a Method, as may be of general Advantage, and also carried to that Perfection, which in all Arts is chiefly sought after. We seem to have made great Advances towards it, in this part of Italy, since not only in Venice, (where all the polite Arts flourish, and which City is the only Example, as it were, now remaining, of the Roman Grandeur and Magnificence,) some Buildings are now erected in a good Taste, from the time that James Sanfovino, a famous Carver and Architect, first introduced the beautiful Manner, as is evident from the Palace nella nuova Procuratia, (not to mention several other of his excellent Performances) which is perhaps the richest and most sumptuous Edifice, that has been erected since the Antients; but also in several other Places of less Note, and particularly in the City of Vicenza, which though of no great Extent, is yet full of Men of excellent Parts, and abounds sufficiently with Riches. It was here I first had occasion of putting in Practice, what I now publish to the World for general use. In this Place are a great Number of beautiful Fabricks, as well as Gentlemen, studious of this Art, who for their high Birth, and superiour Talents, may justly be ranked among the most Illustrious; such as John George Trissino, the glory of our Age; the Counts Mark Anthony, and Adrian de*

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de Thieni, Brothers, Sig. Antenore Pagello, to omit several others, who have acquired immortal Fame, by the beautiful and magnificent Edifices they have left behind them. There are now living in the same City, Fabio Monza, a Gentleman of universal Knowledge; Elio de Belli, Son of Valerio, so famous for painting in (*) Brooch, and cutting of Chrystal; Anthony Francis Oliviera, who besides his Skill in several Sciences, is an excellent Architect and Poet; a Proof of which he has given in his Poem entitled *Aleman*a, written in Heroick Verse; and in his House at Boschi di Nanto, in the Territory of Vicenza; and lastly, to omit many more whose Names might justly be cited in this Place, Valerio Barbarano, a curious Enquirer into the several Parts of Architecture.

BUT to return to our Subject. It being my Intention to publish the Fruit of that Study and Labour, in which I have been employed from my Youth to this Time, in searching out, and measuring with the utmost Accuracy, all such antient Structures as came to my Knowledge; and being desirous upon this Occasion to write a Summary Treatise of Architecture, in as distinct and methodical a Manner as possible; I thought it necessary to begin with Private Houses, it being reasonable to suppose that these
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(*) *Designs* wherein one Colour only is employed, and the Lights and Shades disposed on a Gold or Azure Ground, and is generally an imitation of *Basso Relievo*.

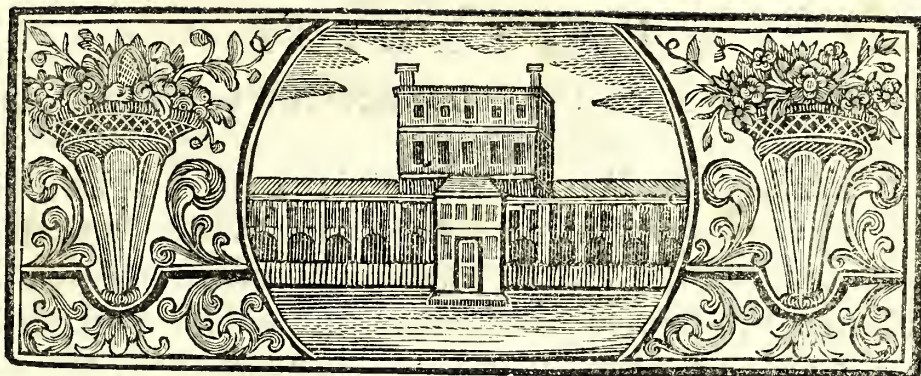
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first gave rise to Publick Edifices. It is moreover probable that Men lived at first apart, and in a solitary Manner; when afterwards finding that they wanted the Assistance of their Fellow-Creatures, in order to obtain those things which might make them happy, (if there be such a thing as Happiness in this World) they naturally sought after, and loved the Company of other Men; whence of several Houses, Villages were made, and in Process of Time of Villages, Cities; and in these they built Squares and Publick Edifices. And as of the several parts of Architecture, none is more useful, or more generally practised than this, I shall therefore first treat of Private Houses, and afterwards of Publick Edifices. I shall likewise touch briefly on Streets, Bridges, Squares, Prisons, Basilica's or Courts of Justice, Xisti and Palæstra's or Places in which Men perform Bodily Exercises; on Temples, Theatres and Amphitheatres, Arches, Baths, Aqueducts, and in fine on the Method of fortifying Cities and Sea-Ports. In all these I will endeavour to avoid Prolixity; and will only give such Instructions, as to me shall appear most necessary, employing those Terms of Art as are now in use among Architects. And as all I myself can boast, is the great Diligence and Pains I have bestowed, and the Affection and strong Passion with which I have pursued both the Theory and Practice of what I now make publick; if it please God that I shall not have laboured in vain,

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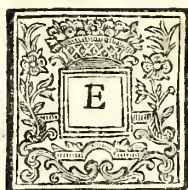
I will thank him with all the Powers of my Soul; acknowledging at the same time my Obligations to those, who by their beautiful Inventions and Experiments, have left us the Precepts of this Art; since they have thereby opened a more easy, as well as expeditious Path to the making of new Discoveries; and that by their means, we have attained to the knowledge of several things, which perhaps had otherwise been hid.

THIS first Part will be divided into two Books. In the first I shall discourse on the several Materials to be provided, and when got, how and in what Manner they are to be employed, from the Foundation to the Roof; for all which I shall give general Rules, that will serve both for Publick and Private Buildings. In the second I shall treat of the Qualities of Buildings, suitable to the different Ranks and Conditions of Men, and first of those of Cities; and shall afterwards speak of such Situations as are proper and convenient for those of Villa's or Country-Houses, and the manner in which they are to be disposed. And as we have but very few antient Originals of this kind to copy after, I shall insert the Plans and Uprights, of several Noblemen's Houses built by me in different Places; together with the Designs of those of the Antients, and of the principal Parts in them, in the Manner Vitruvius has taught, and in which they themselves built them.



CHAPTER I.

*Of the several Particulars to be observed,
and the Preparations to be made, before
we begin to build.*



VERY Man before he begins to build, ought carefully to examine the several Parts of the Plan, and Uprights of the whole Edifice. *Vitruvius* tells us, that in every Building, three things are to be considered, viz. *Conveniency*, *Strength*, and *Beauty*; and that without them no Building can deserve our Applause.

First, That Edifice could not be called a perfect one, which, tho' never so *Commodious*, should be defective in *Strength*, or having both these Qualities, should be wanting in *Beauty*. It will be *Commodious*, if every Part or Member stands in its due Place; a just Regard being had to Dignity and Use; as for Instance, when the Galleries, Halls, Chambers, Cellars, and Garrets, are artfully disposed.

Secondly, A due Regard will be had to *Strength*, when all the Walls shall be carried up directly *plum*; thicker below than above, and their Foundations strong and solid: Care must also be taken, to place the upper Columns directly perpendicular over those beneath; and to make all the Openings, as Doors and Windows, exactly over one another; so that the

solid may be over the solid, and the void over the void.

Thirdly, The *Beauty* will result from the Harmony and Correspondence between the Whole and its Parts, and of the several Parts between themselves; for then the Edifice will appear one entire and perfect Body, in which one Member answers to the other, and all of them together to the whole; so that it may seem absolutely necessary to the Being of the same.

After these several Particulars have been duly examined upon the Model or Draught; an exact Computation must be made of the whole Expence, and a timely Provision made of the several Materials necessary, in order that the Building may be carried on briskly: For if Materials are got in time, the Builder will be commended, and it will likewise be of the utmost advantage to the whole Edifice; and if the Walls are worked up equally, they will settle in the same proportion; and this will be a means of preventing those Crannies which are found in Buildings that were built by starts.

Next, after having made choice of the most skillful Artists, in order that the work may be well carried on under their Direction; you must then get a sufficient Quantity of *Timber, Stones, Sand, Lime, and Metals*; on which it may be proper to make some Observations.

First, For the framing of the Floors of Halls and Chambers; so many Joysfs must be provided, that the whole Frame being laid, the Space between the Joysfs may be the breadth of one Joyfst and an half; then as to Stones, the Jaumbs of the Doors and Windows must not be bigger than one fifth, nor less than one sixth of the Vacuity or Opening. If the Edifice is to be embellished with Columns or Pilasters; the Bases, Capitals and Architraves may be of Stone, and the other Parts of Brick. With respect to the Walls, you must take Care that as they rise, they may diminish proportion-

portionably in Thickness; which Observations will be of great Service, as they will enable you to make a just Estimate of the Quantity of Materials to be provided. But as I shall treat more at large of these several Particulars, under their respective Heads, let it suffice that I have here given these general Hints, and as it were a kind of Sketch of the whole Building.

But as the same Regard is to be had to the Quality and Goodness of the Materials, as to the Quantity; the Experience of those who have built before us, will be of great Use upon this Head. And notwithstanding *Vitruvius*, *Alberti*, and other excellent Writers, have laid down very useful Rules with respect to the choice of Materials, I shall nevertheless take Notice of such as are most essential, in order that nothing may be found wanting in the ensuing Treatise.

C H A P. II.

Of *Timber*.

T*imber*, as *Vitruvius* tells us, in the ninth Chapter of his second Book, ought to be felled in *Autumn*, and during all the *Winter*; for in those Seasons *Trees* have a Strength and Vigour conveyed to them from the Roots, which in *Spring* and *Summer* was diffused among the Leaves and Fruits; they must be felled in the Wane of the *Moon*, for then a certain Moisture, very apt to engender *Worms* and rot *Timber*, is spent and dried up. *Timber* should at first be cut no further than the Pith, when it must be left till it be thoroughly dry, for then the Moisture which engenders putrefaction will all sweat away. Being felled, it must be laid up in a Place where it may be sheltered from warm Suns, high Winds and Rain; particularly those *Trees* which rise out of the Ground without being planted; and to prevent its splitting, you must daub it over with *Cow-dung*. It must never be drawn in the Morning, the Dew then falling,
but

but in the Afternoon; nor must it be worked, if very wet or very dry; for in the former Case it will be subject to rot, and in the latter will make very clumsy Work; nor will it be dry enough, to be wrought into Planks, Doors, and Windows, under three Years. Persons who build, would do well to advise with those who are skilled in *Timber*, by enquiring into the Nature thereof, and what kind of it is fit for such and such Uses. *Vitruvius* in the above-cited Chapter gives very useful Instructions upon this Head, not to mention several others who have written copiously on the same Subject.

C H A P. III.

Of Stones.

OF Stones, some are formed by Nature, others by Art; the former are dug out of the Quarry, and are used either in making *Lime*, or in raising Walls; we shall take Notice of the former hereafter. Those Stones which are to be employed in building Walls, are either very hard, as *Marble* and *Live-Stone*; or soft, as *Free-Stone*. The former must be wrought immediately after they are dug up, which may then be done with less Trouble; for all Stones, the longer they are exposed to the Air, the harder they grow. But for those of a soft Kind, particularly if their Nature and Qualities are not known; as when Stones are raised out of a Quarry that was never opened before; they should be dug in *Summer*, and be sheltered from Winds, Rain, and Mists, whereby they will harden by degrees, and resist all inclemencies of the Weather. Another Reason for keeping them so long, is, that you may pick out such as you find damaged, in order to lay them in the Foundations, and employ those which are not so, in those Parts of the Building that are in View, for these will last a long Time.

Artificial

Artificial *Stones*, from their Shape, generally go by the Name of *Quadrelli*, or *Bricks*, and are made of a chalky, whitish and soft Earth, which must be purged from *Clay* and *Sand*. The Earth must be opened in *Autumn*, and be tempered in the *Winter*, and the *Spring* following be made into *Bricks*. But if Necessity obliges you to mould them in *Winter* or *Summer*, you must cover them with dry *Sand* during the former, and with *Straw* during the latter. Being made, they must be set to dry a considerable time, for which purpose a shady Place is best, for then the Outside and Inside will be equally dried, and this will take up full two Years. They are to be made larger or smaller, according to the Quality of the Building, and the Uses to which they are to be employed, and this was the Practice of the Antients. Those which are pretty thick, should have Holes bored in them in several Places, for then they will both burn and dry the better.

CHAP. IV.

Of *Sand*.

THERE are three Sorts of *Sand*, viz. *Pit-Sand*, *River-Sand*, and *Sea-Sand*. Of these the best of all is *Pit-Sand*, and is either of a Black, White, Red, or Ash-Colour, which last is a kind of Earth burnt by Fire, pent up in the Cavities of Mountains, and is found in *Tuscany*. There is also found in *Terra di Lavoro*, in the Territories of *Baia* and *Cuma*, a kind of *Sand*, called by *Vitruvius*, *Pozzolana*, which being thrown into Water, immediately cements, and makes very good *Mortar*. Long Experience has taught us, that among the several kinds of *Pit-Sand*, the White is the worst; and of *River-Sand*, the best is that which is found in rapid Streams, and under Water-falls, because it is most purged.

C

Sea-

Sea-Sand is the worst of all, but must be of a blackish Colour, and shine like Glass; but that whose Particles are biggest, and lies nearest the Shore, is to be preferred. *Pit-Sand* being fatter than the rest, makes for that reason a more tenacious Cement, and is therefore employed in Walls and long Vaults, but then it is apt to crack. *River-Sand* does very well for rough-casting of Walls; *Sea-Sand*, as it is soon wet and soon dry, and melts away presently because of its Salt, is therefore unfit to sustain any considerable Weight. That *Sand* is best in its kind, which being bruised between the Fingers, makes a crackling Noise; or if being laid upon any white Substance, neither stains, or makes it foul. On the contrary, that *Sand* is bad, which mixed with Water, makes it dirty and muddy, or that which has been a long time exposed to the Weather; because it will retain much Earth and rotten Moisture, that is very apt to bring forth Shrubs and other spontaneous Plants, which are of great prejudice to a Building.

CHAP. V.

Of *Lime*, and the Method of working it.

STONES, whereof *Lime* is made, are either dug out of Hills, or taken out of Rivers. Those *Stones* of the Hills are good, which are dry, free from Moisture, and brittle; and that have no mixture of any Substance in them, which being wasted away in the Fire, shall lessen the bulk of the *Stone*; the best *Lime* is made of the hardest, soundest and whitest *Stone*, and which, after being burnt, remains a third part lighter than the *Stones* of which it was made. There are also others of a spongy nature, which make very good *Lime* for rough-casting of Walls. Certain scaly *Stones* are also dug out of the Hills of *Padua*, which make a kind of *Lime*, that is of very great Service to such Buildings

Buildings as are exposed to the Weather, or in the Water, for it immediately grows hard, and is very strong and lasting. All *Stones* dug newly out of the Quarry, are better to make *Lime*, than those which are gathered up and down, and have lain a long time exposed to the Weather; from a shady and moist Pit, rather than from a dry one, and the white better than the brown. Those *Pebbles* which are found in Rivers and rapid Streams, are excellent for *Lime*, and make very white, neat and smooth Work, for which Reason it is chiefly used in the rough-casting of Walls. All *Stones*, whether of the Hills or of Rivers, burn quicker or slower, in proportion to the Fire which is given them, but they are generally burnt in threescore Hours. After they are burnt and turned to *Lime*, this latter must be wetted in order to slack it, observing not to pour the Water on all at once, but at several times, to prevent its burning before it be well tempered. It must afterwards be laid in a moist and shady Place, taking care not to mix any thing with it, only covering it lightly with *Sand*, and the more it is bruised and mixed with the *Sand*, the better it will cement, except that which is made of a scaly *Stone* like that of *Padua*, because it must be worked immediately after it is kiln'd, to prevent its burning and consuming away, for then it looses its cementing Quality, and is good for nothing.

In making *Mortar*, the proportion of *Sand* to be mixed with it is as follows; if it be *Pit-Sand*, you must take three Parts of it and one of *Lime*; if of *River* or *Sea-Sand*, two Parts of *Sand*, and one of *Lime*.

C H A P. VI.

Of *Metals*.

THE *Metals* employed in building are *Iron*, *Lead*, and *Copper*. Of *Iron* are made Cramps, Nails, Hinges, Bolts, Gates, Bars, and such like Works. 'Tis no where found pure, but when the Oar is dug out of the Earth, it must be purged with Fire, when it becomes liquid, so that it may be easily cleared of its foulness before it cools; after it is purged and cool, it shines, is soft and yields to the Hammer. But it cannot easily be melted a second time, unless it be thrown into a very hot Furnace made for that purpose; and it must be beat when red-hot, otherwise it consumes and wastes away. One mark of the goodness of *Iron*, is when being worked into Bars, its Veins are found to run strait and unbroken, and that the ends of the Bars are clean and without foulness; for these Veins are a proof that the *Iron* is free from Knots and Flaws; by its Ends we may know the goodness of the Middle; if its Sides, after it is wrought into square Plates or any other Shape, are found to be strait, we may pronounce it equally good in all its parts, as it has equally endured the Hammer.

Lead is made use of to cover magnificent Palaces, Churches, Towers, and other publick Edifices, as also for Pipes and Gutters to convey Water; it is also employed to fasten all kinds of *Iron-work* in *Stone*. There are three kinds of *Lead*, viz. White, Black, and of a Colour between both, whence it is called by some Ash-Colour. The Black, though so called, is not really of that Colour, but has only a few black Spots in it, wherefore the Antients, to distinguish it from the other, gave it not improperly the Name of Black. The White is more perfect, and of greater

greater Value than the Black ; and the Ash-Colour is next. *Lead* is either dug in great natural Lumps, or in lesser Pieces, that shine with a blackish cast ; or it is found in very thin Leaves, that cleave to *Stones*, *Marbles*, and *Flints*. Every kind of *Lead* is easily melted, because the heat of the Fire makes it liquid before it is red-hot ; but if it be thrown into an extreme hot Furnace, it loses its Substance, for one part turns to *Litharge*, and the other to Dross. Of these three sorts of *Lead*, the Black is soft, and for that reason is easily beat, and is heavy and weighty ; the White is harder and lighter ; the Ash-Colour is much harder than the White, and is of a middle weight between both.

Copper is sometimes employed to cover Publick Edifices, and the Antients used to make a kind of Cramps or Hooks with it, which being fixed in the *Stones*, keeps them tight together, so that they never loosen ; by means of these Cramps, a Building, which must necessarily be made of a great Number of *Stones*, is so joined and fixed together, that it appears to be but one entire Piece, which for that Reason is much stronger and more durable. These Cramps or Hooks are now made of *Iron*, but the Antients chose rather to make them generally of *Copper* ; because as that Metal is not subject to rust, it therefore lasts much longer. They likewise employed this Metal in the making Letters for *Inscriptions* that were placed in the Freezes of Buildings ; and History informs us, that the famous Hundred Gates of *Babylon* were made of it ; as also the two Pillars of *Hercules*, eight Cubits high, in the Island of *Gades*. That *Copper* is esteemed the best of all, which when drawn out of the Mine, and purged by Fire, is of a Red Colour inclining to Yellow, and full of little Holes or Pores ; for this is a mark that it is thoroughly purged, and has not the least Dross remaining. *Copper* may be heated like *Iron*, and rendered

dred liquid, and by that Means may be cast ; but if it be thrown into too hot a Furnace, it yields to the strength of the Fire, and quite consumes in it. This Metal though hard, may yet be rendred so soft and pliable, as to be wrought into very thin Leaves. The best way to preserve it, is to lay it in *Tarr* ; and though it does not rust like *Iron*, it nevertheless gathers a Rust peculiar to it self, which is called *Verdigrease*, especially if it touch any thing that is sharp and moist. This Metal being mixed with *Tin*, *Lead*, or *Latten*, which last is another kind of *Copper*, but coloured with *Lapis Calaminaris*, makes a Metal called *Brass*, which is often employed by Architects in making of Bases, Columns, Capitals, Statues, and such like Ornaments. There are in the Church of *San Giovanni Lateranno* in *Rome*, four *Brass* Columns, one of which only has its Capital ; these were made by Order of *Augustus*, of the Metal that was found in the Prows of those Ships, he took from *Mark Anthony* in *Epirus*. There are four ancient Gates made of this Metal still remaining at *Rome*, viz. that of the *Rotunda*, before called the *Pantheon* ; that of *St. Adrian*, once the Temple of *Saturn* ; that of *S. Cosmo* and *St. Damian*, formerly the Temple of *Castor* and *Pollux*, or perhaps that of *Romulus* and *Remus* ; and that of *St. Agnes* without the Gate *Viminalis*, now called *St. Agnes, su la Numentana*. But the most beautiful of all these Gates is that of *Santa Maria Rotunda*, wherein the Antients imitated by Art, that Species of the *Corinthian* Metal in which the Colour of Gold prevailed : For we read, that when *Corinth* was burnt and destroyed, all the *Gold*, *Silver* and *Copper* that were in the City, being melted down, and mixed together in several Lumps, Chance tempered variously those three different Metals, and composed these three sorts of *Copper*, which were afterwards called *Corinthian*. That in which *Silver* prevailed, retained the whiteness

ness thereof; where *Gold*, it had a yellow cast; and the third was that in which all the three Metals were pretty equally mixed; and Workmen have since attempted to imitate variously all these three Metals.

Hitherto I have taken Notice of such Particulars as are to be considered, and the several Materials that are to be provided, before we begin to build; we must in the next place discourse upon the *Foundations*, since these are first laid before we begin the Building.

C H A P. VII.

Of the Quality of the Ground in which the Foundations are to be laid.

THE *Foundation*, i. e. that Part which is under Ground that sustains the whole Edifice, is properly called the Basis thereof. Of all the Errors that may be committed in building, those are the most fatal that are made in the *Foundation*, because they at once endanger the whole Fabrick, nor can be rectified but with the utmost Difficulty; for which Reason the Architect must take great Care to pitch upon a good *Foundation*, since in some Places they are naturally strong and solid, and in others Art must be employed to make them so. A natural *Foundation* is when the Soil is rocky, or of a soft, sandy *Stone* or *Gravel*, which is a kind of Earth inclining to the rocky; for these, without digging, or any other assistance from Art, are of themselves very strong *Foundations*, and capable of sustaining the greatest Edifice, either on Land or Water. But when Nature does not furnish a *Foundation*, Art must be made use of; and here the Place to build on, is either a solid Earth or Clay; a sandy, soft and moist Ground, or marshy Land. If the Earth be firm and solid, the *Foundation* may be made
of

of such a depth, as to a judicious Architect may appear requisite, for the largeness of the Building, and the strength of the Soil; and if there are to be no Cellars nor subterraneous Offices, it will be sufficient to dig a sixth Part of the Height of the Building. The solidity and firmness of the Earth may be known, by digging of Wells, Cisterns, and such like; and also by the Herbs that grow upon it, if they are such as spring up only in a hard and firm Soil. Another Mark of the strength and firmness of the Earth, is, when any great Weight being thrown upon it, it neither shakes nor resounds; which may easily be observed by the Help of a Drum, if when being set upon the Ground, and lightly touched, it does not resound again, nor shake the Water in a Vessel set near it. The strength and solidity of the Ground, may likewise be known by the firmness of the Earth, in the Places adjacent. But if it be a sandy or gravelly Spot, Regard is to be had whether it be on Land, or in the Water; because if it be on Land, we need only observe what has been already mentioned concerning firm Ground. If we build in the Water, the *Sand* and *Gravel* will be altogether useless, because the Water by Reason of its continual Current and Flood, is ever shifting its Bed; we must therefore dig till we find a firm and solid Bottom; or if this cannot easily be done, we must then dig a little in the *Sand* and the *Gravel*, after which Piles made of *Oak*, must be drove in, till their Ends reach the good Ground, and on these we may build. But if we are obliged to build upon mossie and loose Earth, we must then dig till we find sound Ground, and that in Proportion to the thickness of the Walls and the greatness of the Fabrick. This sound and firm Earth, fit to sustain a Building, is of various kinds; for, as *Alberti* well observes, in some Places it is so hard, that *Iron* can hardly force its way into it, and sometimes harder than *Iron* it self;

in some Places it is blackish, in others whitish (which is looked upon as the weakest) in some it is like *Chalk*, and in others soft and sandy. Of these several kinds, that is the best which is cut with most Labour and Difficulty, or when wet, does not dissolve away in Mud and Dirt. We must never build upon an old *Foundation*, before we know its Depth, and if sufficient to sustain the Fabrick. But if the Earth you build upon be very soft, as in moorish Grounds, in this Case you must strengthen it with Piles, whose length must be the eighth Part of the height of the Walls, and their Diameter the twelfth Part of their length. These Piles must be drove in so close to one another, as not to leave Space for others to be set between them; and care must be taken to ram them in with Blows rather frequently repeated than violent, for by this Means the Earth will better consolidate. Piles must be drove, not only under the Out-Walls, but also under the Inner or Partition-Walls. For if the *Foundations* of the Inner Walls, are weaker than those of the Outer-Walls; when you come to lay the Girders and the Joys, you will find by Experience, that the Inward Walls will sink, while those on the Out-side will stand firm, because they were raised on Piles; then all the Walls will crack, and ruin the whole Edifice; not to mention that these Crevasses are very disagreeable to the Eye. As therefore the Expence for Piles, will be of less Consequence, than the endangering of the whole Fabrick, you must not be sparing, but distribute them according to the Proportion of the Walls; taking Care that those within, be placed somewhat thinner than those on the outside of the Building.

C H A P. VIII.

Of *Foundations*.

THE *Foundation* must be twice as thick as the Wall to be raised thereon; and here regard must be had to the quality or goodness of the Ground, and the weight of the Edifice; observing to make the *Foundation* wider in soft and loose Ground, and on which a very large Fabrick is to stand. The *Plan* of the Trench must be exactly level, in order that the weight may press equally in all Parts, and not lean more to one side than the other, which occasions the cleaving and dividing of the Walls. For this reason the Antients used to pave the *Plan* with *Tivertine*, but we lay Planks or Beams, and on these we build. The *Foundations* must be made sloping, that is to say, they must diminish in Proportion as they rise, yet in such a Manner, that there may be as much left on one side, as on the other; so as the middle of the Wall above, may be directly perpendicular over the middle of that below, which must be also observed in the diminishing of Walls above Ground; for this will make the Building much stronger, than if the diminutions were made any other way. Sometimes, in order to lessen the Expence, and particularly in moorish Grounds, where we are obliged to make use of Piles, the *Foundations* must be arched, and on this the Building must be raised. In large Edifices, it is very proper to make Vents, or Holes, through the Body of the Walls, from the *Foundations* to the Roof, which will let out the Winds and Vapours, that are very prejudicial to the Building, lessen the Charge, and will likewise be found extremely

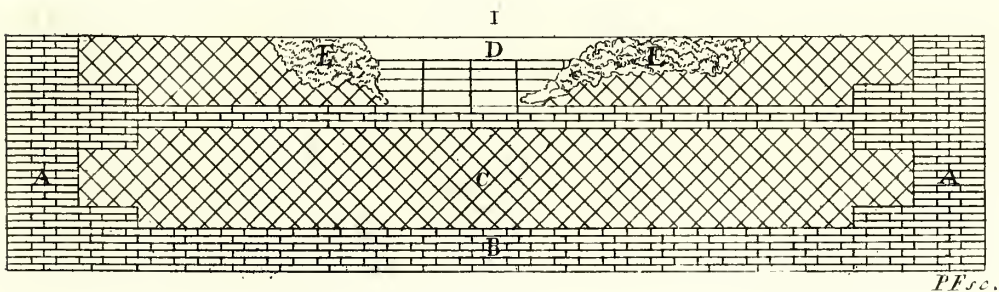
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convenient, if winding Stairs are to be made from the Bottom to the Top.

CHAP. IX.

Of the various kinds of Walls.

THE *Foundations* being laid, we are next to treat of the *Walls* that are to be raised above Ground. There were six Sorts of *Walls* among the Antients: The first called *Reticolata* or *Net-Work*; the second of *Quadrels* or *Bricks*; the third of *Cement*, composed of *Flints* or *Pebbles*; the fourth of *irregular* and *various Stones*, and called *Rustick*; the fifth of *Free-Stone*; and the sixth or last of *Riempiuta* or *Coffer-work*. The *Net* or *Checquer-work* is not practiced by the Moderns, but as *Vitruvius* relates that it was very common in his Time, I thought proper to insert a Design thereof. It was their Custom to make the Angles, or Corners of the Building of *Bricks*, and to lay between every two Foot and a half, three Courses of *Bricks*, which served as a kind of band to the whole Work.



- A. *Angles made of Brick.*
- B. *Courses of Bricks that bind the whole Wall.*
- C. *The Net-work.*
- D. *Courses of Bricks through the thickness of the Wall.*
- E. *Middle of the Wall made of Cement.*

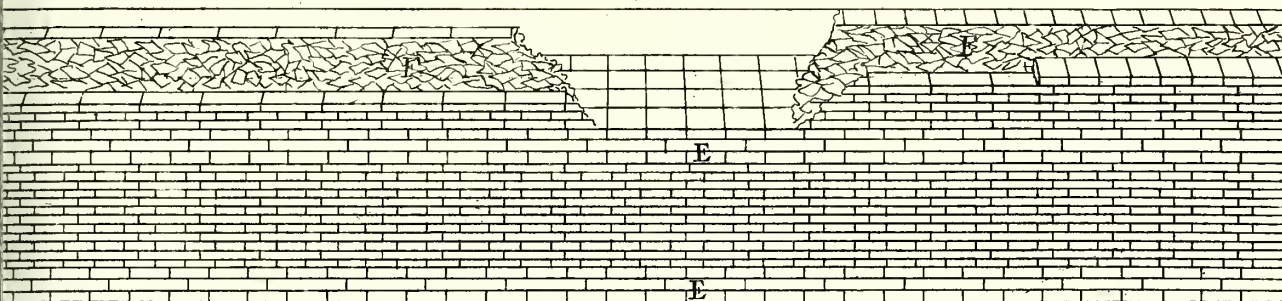
2. *Brick-Walls*, that furround Cities, or that are designed for any great Edifice, ought to be faced on both Sides with *Brick*, and the middle filled with *Cement*, rammed together with *Brick-bats*; and to every three Foot in height, there must be three Courses of *Bricks*, of a larger Size than the rest, to bind the whole breadth of the *Wall*; observing to lay the first Course, so that the lesser Side of the *Brick* may be outward; the second length-way, that is, with its largest Side on the outside, and the third as the first. The *Walls* of the *Rotunda* at *Rome*, those of the Baths of *Dioclesian*, and of the other antient Edifices there, are all after this Manner.

3. *Cement-Walls*, must be made in such a Manner, that to every two Foot at least, there may be three Courses of *Brick*, and disposed as above. Of this kind are the *Walls* of *Turin* in *Piedmont*, that are made of large *River-Pebbles* split in the middle, and set in the *Wall* with the split-side outwards, which makes very neat Work, and is agreeable to the Eye. The *Walls* of the *Amphitheatre* of *Verona* are also of *Cement*, and have three Courses of *Brick* to every three Foot, as in several other antient Buildings, which may be seen in my Book of *Antiquities*.

4. The *Walls* made of *irregular Stones*, were called *Rustick*; and in the raising of these they used a *Leaden Rule*, which being bent according to the Place where the *Stone* was to be set, shewed how it was to be squared; so that when it was once cut, they immediately fixed it in its Place. Of this Kind are the *Walls* of *Preneſte*, and the Antients used to pave their Streets after the same Manner.

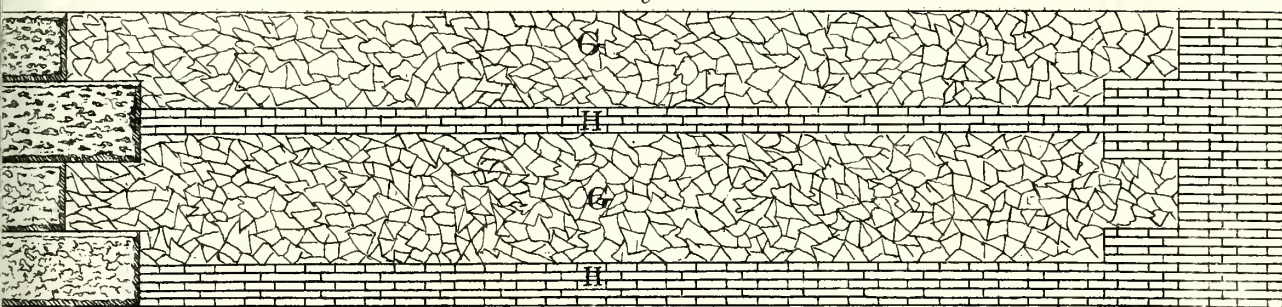
5. *Walls*

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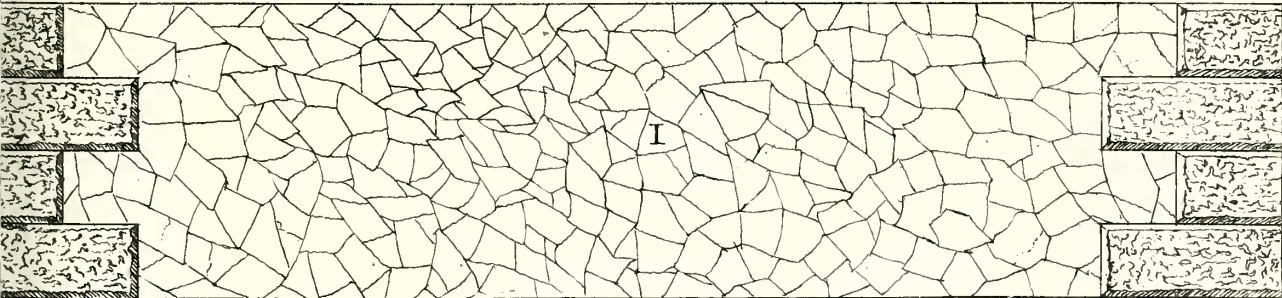
E. *Courses of Bricks that bind the whole Wall.*
 F. *The inward part of y^e Wall made of Cement, between the several Courses, and the outward Bricks.*

3



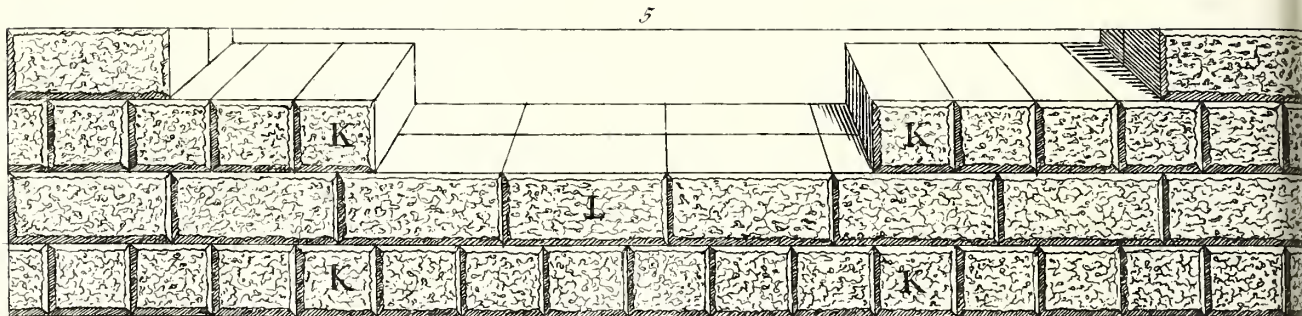
G. *Cement or River Pebbles.*
 H. *Courses of Bricks that bind the whole Wall.*

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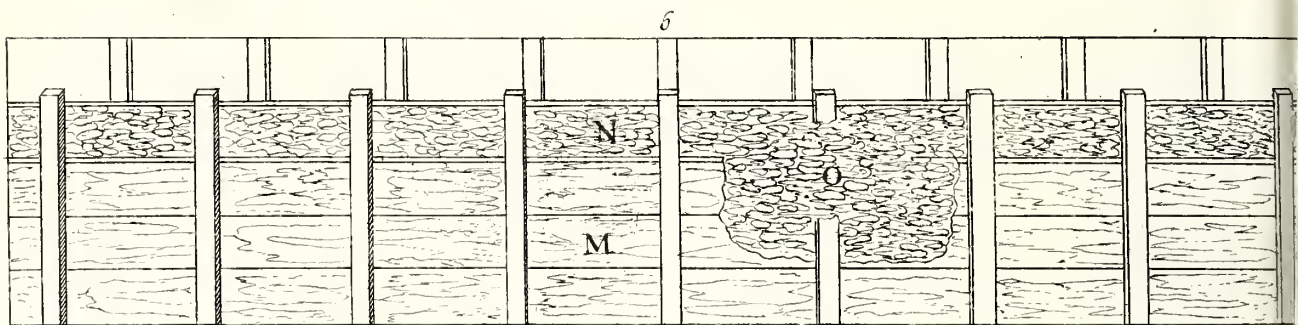


I. *Irregular or Rough Stones.*

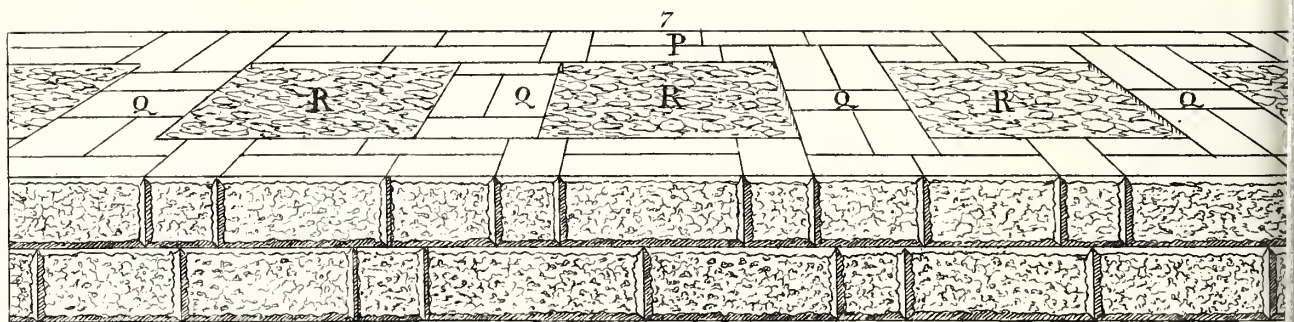
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K. *Courses of lesser Stones.*
 L. *Courses of larger Stones.*



M. *Planks laid Edgeway.*
 N. *Inner Part of the Wall.*
 O. *Face of the Wall, the Planks being taken away.*



P. *Walls faced with Stone.*
 Q. *Cross binding Courses of Stone.*
 R. *Coffers filled with Stones and Earth.*

5. *Walls* of *Free-Stone* may be seen at *Rome*, in the Place where formerly stood the *Piazza* and Temple of *Augustus*, and here the lesser *Stones* were inclosed with some Courses of larger ones.

6. The Antients used to make *Walls* called *Riempita* or *Coffer-Work*, by taking Planks laid Edge-Way, according to the Thickness of the *Walls*, filling the Void with *Cement* and all kind of *Stones* mixed together, and continued in this Manner from Course to Course. *Walls* of this Kind are found at *Sirmion*, upon the Lake *di Garda*.

7. The antient *Walls* of *Naples* may also be said to be of this Kind; for they have two *Walls* of *Free-Stone*, four Foot thick, and six Foot distant from one another. These *Walls* are bound together with others that run cross them, or *Crossing-Rows*; and the *Coffers* that are between these *Crossing-Rows* and outward *Walls* are six Foot square, and are filled with *Stones* and *Earth*.

In fine, these are the several *Walls* the Antients made, Foot-steps of which still remain to this Day, by which we find, that all kinds of *Walls* must have some Bonding Courses, as so many Sinews, to fasten together all the other Parts; and this must be particularly observed in *Brick-Walls*, in order that if the middle of the *Wall* should sink through Length of Time, the rest may not be subject to Ruin, as we see in many *Walls*, particularly on that Side that looks towards the *North*.

C H A P. X.

The Method practised by the Antients, in erecting Stone Edifices.

AS it frequently happens that an Edifice is to be built entirely, or a good Part of it, of *Marble*, or other large *Stones*, it may be very proper to relate in this Place, what the Antients observed on this Head; because we find they were so very nice and exact in joining the *Stones* together, that one can scarce discern the Joynts in a great many Places, which I think of very great Consequence, as it contributes not only to the Beauty, but to the Strength and Solidity of the Fabrick. And as far as I could understand, they first squared and wrought those Sides of the *Stones*, that were to be laid one above the other, leaving the other sides rough, after which they were employed in the Building; so that the Angles or Edges of the *Stones* being not so sharp, they could better move them up and down till such Time as they joyned well, and were not in the least Danger of breaking, than if all the Sides had been squared, for then the Angles being too thin, are the more apt to break. In this manner they used to make all their *Stone* Edifices rough, and as it were *Rustick*, and when these were finished, they continued to work and polish those sides of the *Stones* that were exposed to Sight. It is true indeed, that as the *Roses* between the *Modillions*, or other Ornaments of the *Cornice*, could not be conveniently worked after the *Stones* were fixed, they made them while they lay on the Ground. This is manifest by many antient Edifices, wherein several *Stones* are found, that were left unwrought and unpolished. The *Arch* near the old Castle in *Verona*, and all the other Arches and
antient

antient Edifices in that Place, were made after the same Manner; this we easily discover, by the Marks of the Tools, they shewing in what Manner the *Stones* were wrought. The *Columns* of *Trajan* and *Antonin* at *Rome* were thus wrought, otherwise it would have been impossible to have fixed the *Stones*, so as to make the Joynts meet so close together cross the Heads, and other Parts of the Figures. The same I say of those *Triumphal Arches* that are found there; for when they had any very large Fabrick to erect, as the *Amphitheatre* of *Verona*, that of *Pola*, and such like; to save Time and Expence, they only wrought the Imposts of the *Arches*, the *Capitals* and *Cornices*, leaving the rest *Rustick*, having regard only to the Beauty of the whole Edifice. But in Temples, and other magnificent Fabricks that require great Delicacy, they were not sparing of their Labour in working them, but glazed and polished even to the very *Flutes* of the *Columns* with the utmost Care and Exactness. In my Judgment therefore, *Brick-Walls* should not be made *Rustick*, much less the *Mantle-trees* of *Chimneys*, which require very neat and curious Workmanship; for besides its being misapplyed in that Place, it would follow that a *Work*, which ought naturally to be one entire Piece, would appear to be divided into several Parts. But it may be made either *Rustick*, or in an elegant Taste, according to the Greatness and Quality of the Fabrick; for what the Antients practised with Judgment, forced to it as it were by the greatness of their Edifices, must not be imitated by us in Buildings, in which Neatness is particularly required.

C H A P. XI.

*Of the Diminution of Walls, and their
several Parts.*

WALLS as they rise, must diminish proportionably in thickness, and those which appear above Ground must be half as thick as the *Walls* in the *Foundations*; those of the second Story half a Brick thinner than the *Walls* of the first, and in this manner to the top of the Building, observing however not to make the upper Part too weak. The middle of the *Walls* above, must be directly perpendicular over the middle of those beneath, which will give the whole *Wall* a *Pyramidal* Form. Moreover, when you are obliged to make the Superficies of the upper *Wall* directly over that beneath, it must be done inwardly; for the Floors, the Beams, the Vaults, and other Supports of the Fabrick, will keep the *Walls* from falling inward. The discharged parts or Sett off on the outside, must be covered with a *Fascia* and a *Cornice*, which surrounding the whole Building, will be both an Ornament and a kind of binding to it. As the Angles of a Building are common to two Sides or Faces, to keep them upright and tight together, Care must be taken to make them very strong and solid, and to hold them with long and hard *Stones*, as it were with Arms. Wherefore the Windows and other Openings, ought to be as far distant from the Angles as possible; or at least so much Space must be left, as is the breadth of the said Opening. Having thus treated of plain *Walls*, we shall next consider their Ornaments, among which none are more considerable than *Columns*, when they are properly placed, and in a just Proportion to the whole Edifice.

C H A P. XII.

Of the five Orders of Architecture used by the Antients.

THE Antients had five Kinds or Orders of Architecture, viz. the *Tuscan*, *Dorick*, *Ionick*, *Corinthian*, and *Composite*; which must be disposed in such a manner, that the most strong and solid may be always undermost, for then it will be the better able to sustain the whole Weight, and the Fabrick will stand on a firmer *Basis*; for which reason the *Dorick* must always be set under the *Ionick*, the *Ionick* under the *Corinthian*, and the *Corinthian* under the *Composite*. The *Tuscan* being a very plain and simple Order, is therefore very seldom used above Ground, except in those Buildings where one Order only is employed, such as rural Edifices; or very large Fabricks, as *Amphitheatres*, &c. in which, as several Orders are made use of, this may be set under the *Ionick* instead of the *Dorick*. And if the Architect is desirous of leaving out one of these, as for Instance to set the *Corinthian* immediately over the *Dorick*, this may be done, provided the most strong and solid Part be lowest, for the Reasons abovementioned. I shall set down the Measures of each of these Orders separately, not so much according to the Method *Vitruvius* has taught, as pursuant to the Observations I my self have made on antient Edifices; but first I shall mention such Particulars as relate to all of them in general.

C H A P. XIII.

Of the Swelling and Diminution of Columns; of the Intercolumniations and Pilasters.

THE *Columns* in each Order are to be made in such a manner, that the Diameter of the upper part of the *Column*, may be smaller than at the *Base*, and have a little Swelling in the middle. In the Diminution of these we must observe, that the longer the *Columns* are, the less they must diminish, and that, because the height has the effect of Diminution, by reason of the Distance. Wherefore if the *Column* be fifteen Foot high, the Diameter at Bottom shall be divided into six Parts and a half, and five and a half shall be the thickness at Top; if from fifteen to twenty Foot, the Diameter at the Bottom must be divided into seven Parts, and six and a half shall be the Diameter at Top; the same must be observed in those that are from twenty to thirty Foot high, where the Diameter at the Bottom must be divided into eight Parts, seven of which shall be the Diameter at Top; and thus those *Columns* that are of a greater Altitude, will diminish in the abovesaid manner, as *Vitruvius* tells us in the second Chapter of his third Book. But in what manner the Swelling in the Middle is to be made, of this he has only left us a bare Promise; which is the Reason why Writers differ so much from one another upon that Head. The Method I use, in making the Profil of the abovementioned Swelling is as follows. I divide the Fust of the *Column* into three equal Parts, and leave the lower part exactly perpendicular, to the extremity of which I apply a thin Rule, of the same length, or a little longer than the *Column*; and

ARCHITECTURE. 23

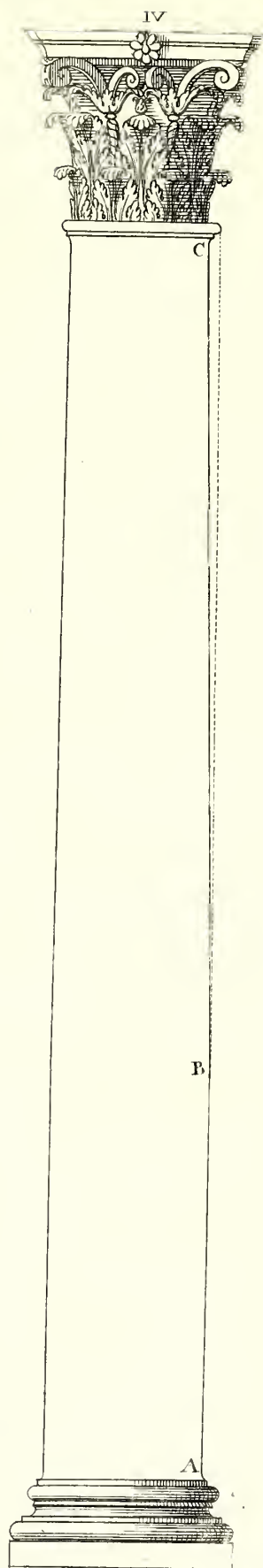
and bending that part of the Rule which comes forward, till such Time as the End of it touches the Point of Diminution, of the upper Part of the *Column* under the *Collarino*, I then mark as that *Curve* directs; thus I have the *Column* swelling a little in the Middle, and projecting forward with great Beauty and Gracefulness. And although I could not find a more concise and expeditious Method than this, yet a Circumstance that gave me a better Opinion of it, was *Signior Pietro Cattaneo's* being so well pleased therewith, as to give it a Place in his Treatise of Architecture, a Work that greatly illustrates our Profession.

A B. *The third Part of the Column, which is directly perpendicular.*

B C. *The two thirds that diminish.*

C. *The Point of the Diminution under the Collarino.*

The Intercolumnations, or Distances between the *Columns*, may be of one Diameter and a half of the *Column*, the Diameter being always taken at the lowest part of the *Column*; or of two Diameters, of two and a quarter, of three, and even more; but the Antients never exceeded three Diameters, except in the *Tuscan* Order, where the Architraves being of *Timber*, they made the Intercolumnations very large; but then they never made them less than



a Diameter and a half, which Space or Distance they particularly observed, when the *Columns* were very high. But they chiefly approved those Intercolumniations, that were of two Diameters and a quarter, and looked upon them as most beautiful and elegant. We must observe very carefully, to keep a due Proportion and Harmony between the Intercolumniations or Spaces, and the *Columns*; because if small *Columns* are made with large Intercolumniations, it will very much lessen the gracefulness of the former; for the too great Quantity of Air, in the void Spaces, will diminish their thickness considerably: And on the contrary, if we make large *Columns* and small Intercolumniations, the too little Vacuity will make them look thick and heavy, and without the least Grace. Therefore if the Spaces be upwards of three Diameters, the thickness of the *Column* must be a seventh Part of its Altitude, as will be hereafter observed in the *Tuscan* Order. But if the Spaces are three Diameters, the length of the *Columns* must be seven Diameters and a half, or eight, as in the *Dorick* Order; if two and a quarter, the *Column* must be nine Diameters in length as in the *Ionick*; and if no more than two, the *Columns* must be nine Diameters and a half in length as in the *Corinthian*; and lastly, if of one Diameter and a half, the length of the *Columns* must be ten, as in the *Composite*. I have been thus careful in making my Observations upon these several Orders, to the end that they may serve for Examples for that variety of Intercolumniations mentioned by *Vitruvius* in the above-cited Chapter. In the Front of Buildings the *Columns* must be an even Number, that there may be an opening in the middle, which should be larger than the other Intercolumniations, for the better receiving the Doors and Entries; so much for single *Pillars* or *Collonades*. But if Galleries are to be made with *Pilasters*, they must be disposed in such a manner, that the thickness of the *Pilasters*

lasters or *Pires* be not less than one third of the Void from *Pire* to *Pire*, and to those in the *Angles* two thirds; which will make the *Angles* of the Building more strong and solid. And when these *Pires* are to support a very great weight, as in considerable Edifices, then they must have half the thickness of the Vacancy, as those of the Theatre of *Vicenza*, and of the Amphitheatre of *Capua*; or else two thirds, as those of the Theatre of *Marcellus* in *Rome*, and that of *Ogubius*, now in the Possession of *Signior Ludovico de Gabrielli*, a Gentleman of that City. But the Antients sometimes made them as thick as the whole Vacancy, as in that Part of the Theatre of *Verona* which does not stand on the Hill. But in private Buildings they must not be less in thickness, than the third Part of the Opening, nor more than two thirds, and should be square; but to save Expence, and make more room for People to pass, they need not be so thick in Flank as in Front; and to embellish it, half *Columns* or *Pilasters* may be placed in the middle, to support the *Cornices* over the Arches of the Gallery, whose thickness must be proportionable to their height, according to each Order, as will be shewn in the following Chapters and Designs. For the understanding of which, and to prevent frequent Repetitions, the Reader is to know, that in the dividing and measuring the above-mentioned Orders, I have not made use of any fixt and determinate Measure peculiar to any Place, as a *Cubit*, a *Foot*, or a *Span*; the several Measures being as different as the Countries; but imitating *Vitruvius*, who divides the *Dorick* Order with a Measure taken from the Diameter of the *Column*, common to all, and by him called a *Module*, I shall likewise use the same Measure in all the Orders. This *Module* is the Diameter of the *Column* at Bottom, and is divided into sixty Minutes, except in the *Dorick*, in which the *Module* is half the Diameter of the *Column*, and is divided into thirty Minutes, this being more commodious in the Divisions of that Order. One may there-

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fore divide the *Module* into more or less parts, according to the Quality of the Building, and make use of the Designs of the Proportions and *Profils* suitable to each Order.

C H A P. XIV.

Of the Tuscan Order.

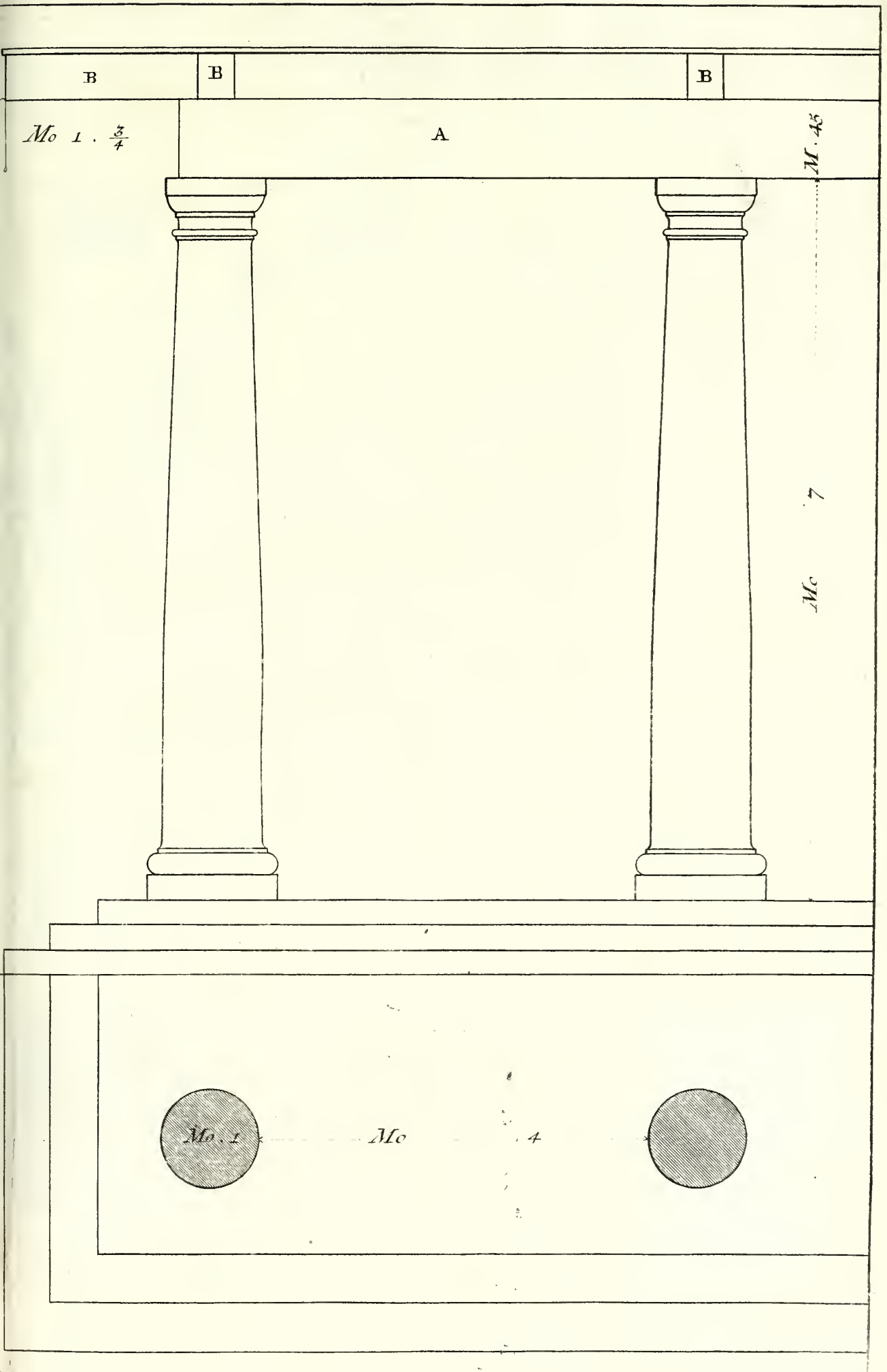
THE *Tuscan Order*, according to *Vitruvius*, and what indeed it appears in effect, is the most plain and simple of all the Orders of Architecture; as it retains more of the old Simplicity, and is devoid of all those Ornaments, which give so great a Grace and Beauty to the others. It was first invented in *Tuscany*, a very considerable Part of *Italy*, whence it derives its Name. The *Column*, together with its *Base* and *Capital*, must be seven *Modules* in length, and its *Diminution* a fourth Part of its bigness. If a Work is to be made of this simple Order, the *Intercolumniations* may be very wide, and that because the *Architraves* are made of *Timber*, which will therefore be very commodious for Country Buildings, by reason of the easy Passage for Carts and other Country Conveniences, not to mention that it will be a much less Expence.

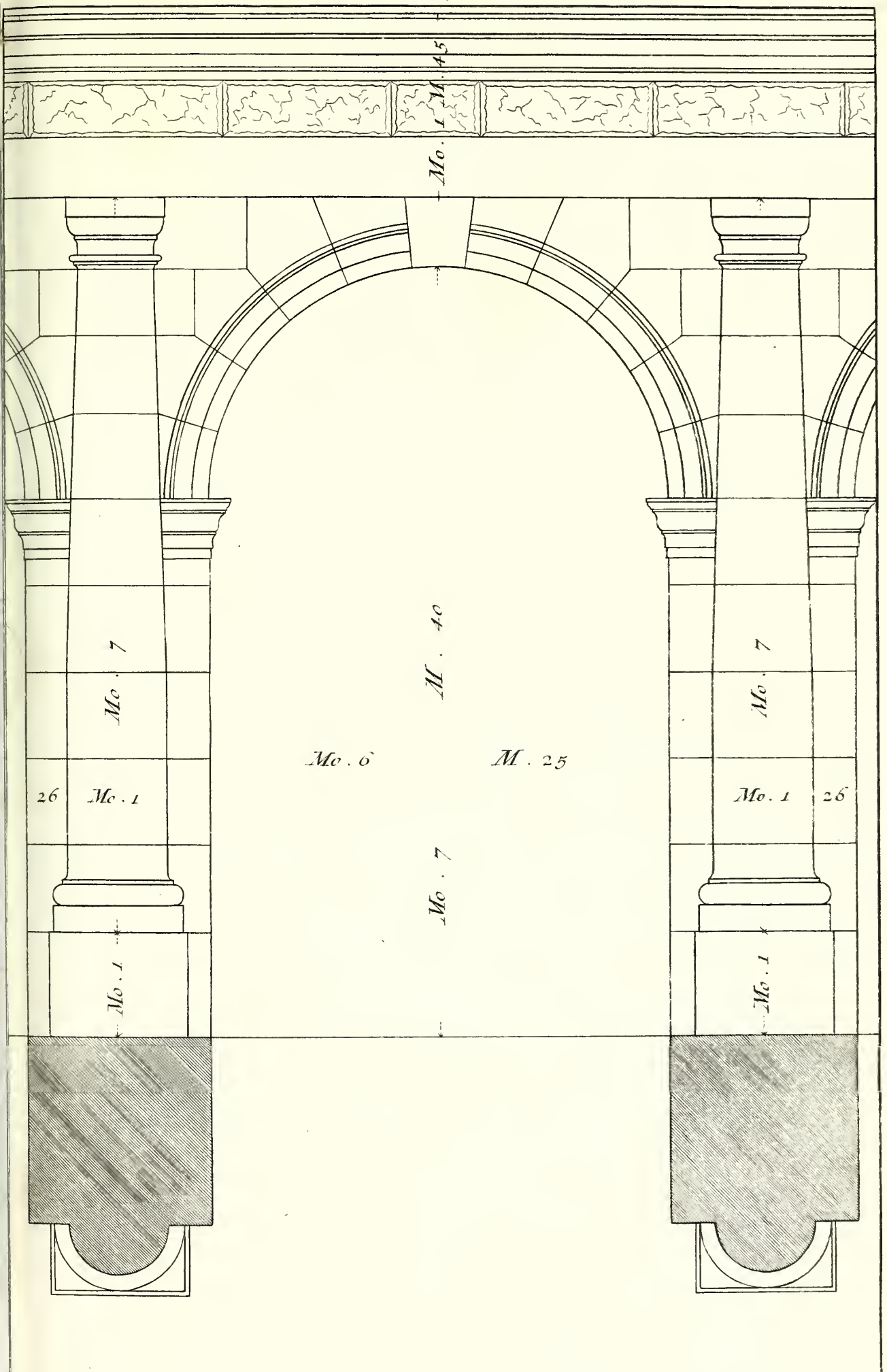
But if there are to be Gates, or Galleries with *Arches*, then they must make use of the Measures, which I have marked in the Design; wherein we see the Stones disposed and joined together in such a manner as appeared to me best, when the whole Edifice is to be of Stone. I have already observed the same, in the Designs of the four other Orders, and have borrowed this Manner of disposing and joyning the Stones, from many antient *Arches*, as will be seen in my Treatise of *Arches*, in the Designs of which I have employed the utmost Care and Diligence.

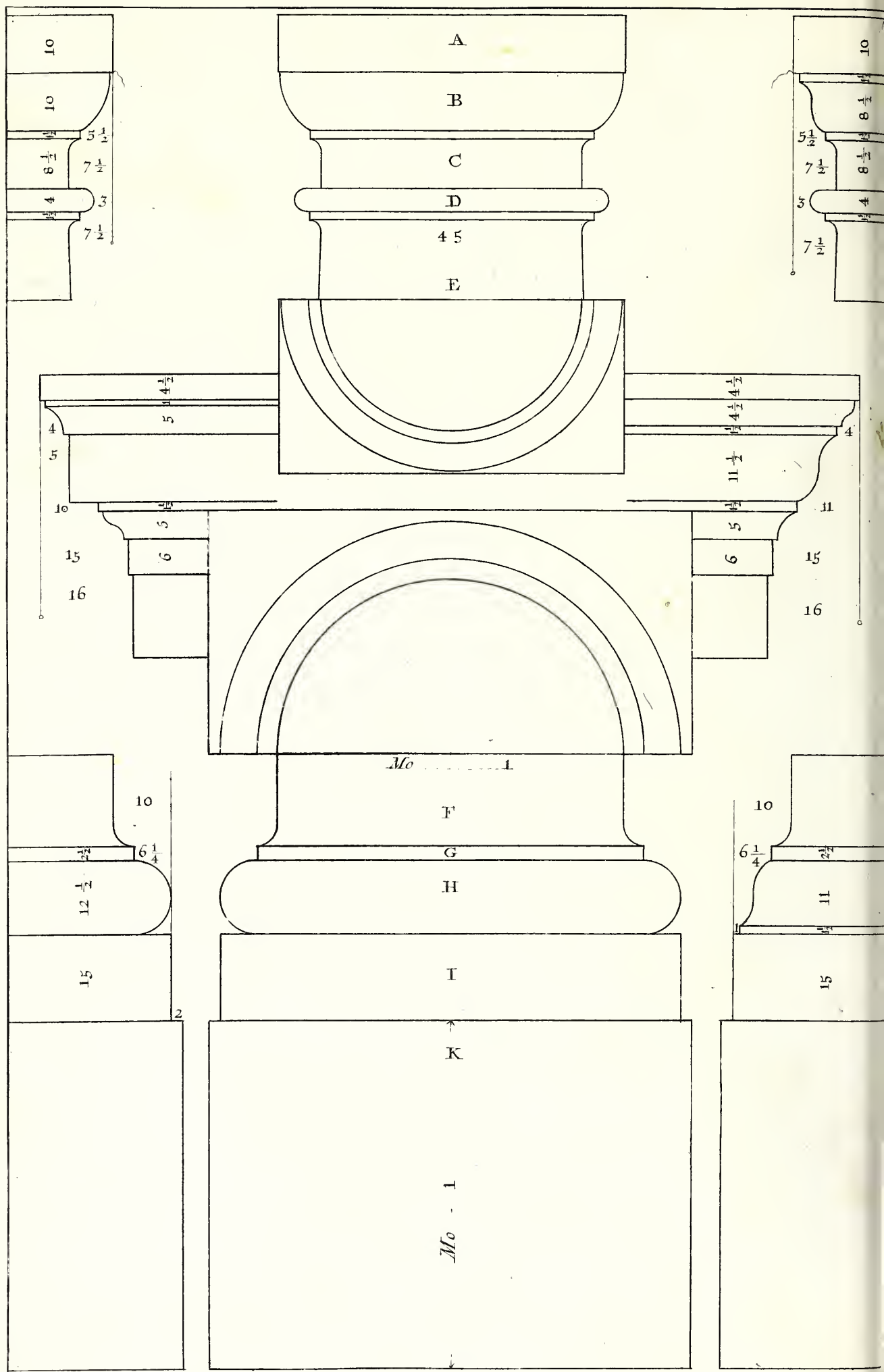
A. *The Architrave of Timber.*

B. *The Joysls which supply the Place of the Guttae.*

The







The *Pedestals*, under the *Columns* of this Order, must be very plain and a *Module* in height. That of the *Base* of the *Column* must be half its *Diameter*. This height is to be divided into two equal Parts, one of which must go to the *Plinth*, which is made round; the other is subdivided into four Parts, one of which is for the *Listella* or *Fillet*, which may sometimes be made a little less; the *Listella* makes a Part of the *Base*, in this order only, in all the others it is Part of the *Column*; the other three Parts are for the *Torus*. This *Base* must project a sixth Part of the *Diameter* of the *Column*. The height of the *Capital* is half the *Diameter* of the lower Part of the *Column*, and is divided into three equal Parts; one is given to the *Abacus*, which from its Shape is usually called *Dado* or a *Dye*; the other to the *Ovolo*, and the third is subdivided into seven Parts: Of one of these the *Listella* under the *Ovolo* is made, and the remaining six are for the *Collarino* or *Neck* of the *Column*: The height of the *Astragal* is double that of the *Listella* under the *Ovolo*; and its Center is made on the Line, which falls perpendicular from the foresaid *Listella*; the Projecture of the *Cincture* falls *plum* upon the *Listella*, which is as thick as the *Listella*. The Projecture of this *Capital* answers to the *Shaft* of the *Column* below. Its *Architrave* is made of Timber, the height of which must be equal to its breadth, and its breadth must not be greater than the *Shaft* of the *Column* at Top; the *Joysts* which supply the place of the *Guttæ* or *Drip*, project a fourth part of the length of the *Column*. Here follows the Measures of the *Tuscan* Order, according to *Vitruvius*.

A. *Abacus*.

B. *Ovolo*.

C. *Collarino*.

D. *Astragal*.

E. *The Shaft of the Column at Top*.

F. *The Shaft of the Column below*.

G. *Cincture*.

H. *Torus*.

I. *Orlo*.

K. *Pedestal*.

The

The *Profils* by the side of the Plan of the *Base* and *Capital*, are the *Imposts* of the *Arches*.

But if the *Architraves* are made of Stone, what I before mentioned with respect to the *Intercolumniations* must be observed. There still exist some antient Edifices, which as they partly retain the same Measures, may be said to have been of this Order; such as the *Arena* of *Verona*, the *Arena* and *Theatre* of *Pola*, and many others that might be mentioned, from which I have taken the *Profils* of the *Base*, *Capital*, *Architrave*, *Freeze*, and *Cornice*, as may be seen in the last Plate of this Chapter; as also those of the *Imposts* of the *Arches*.

I shall insert the several Designs of all these Edifices, in my Book of *Antiquities*.

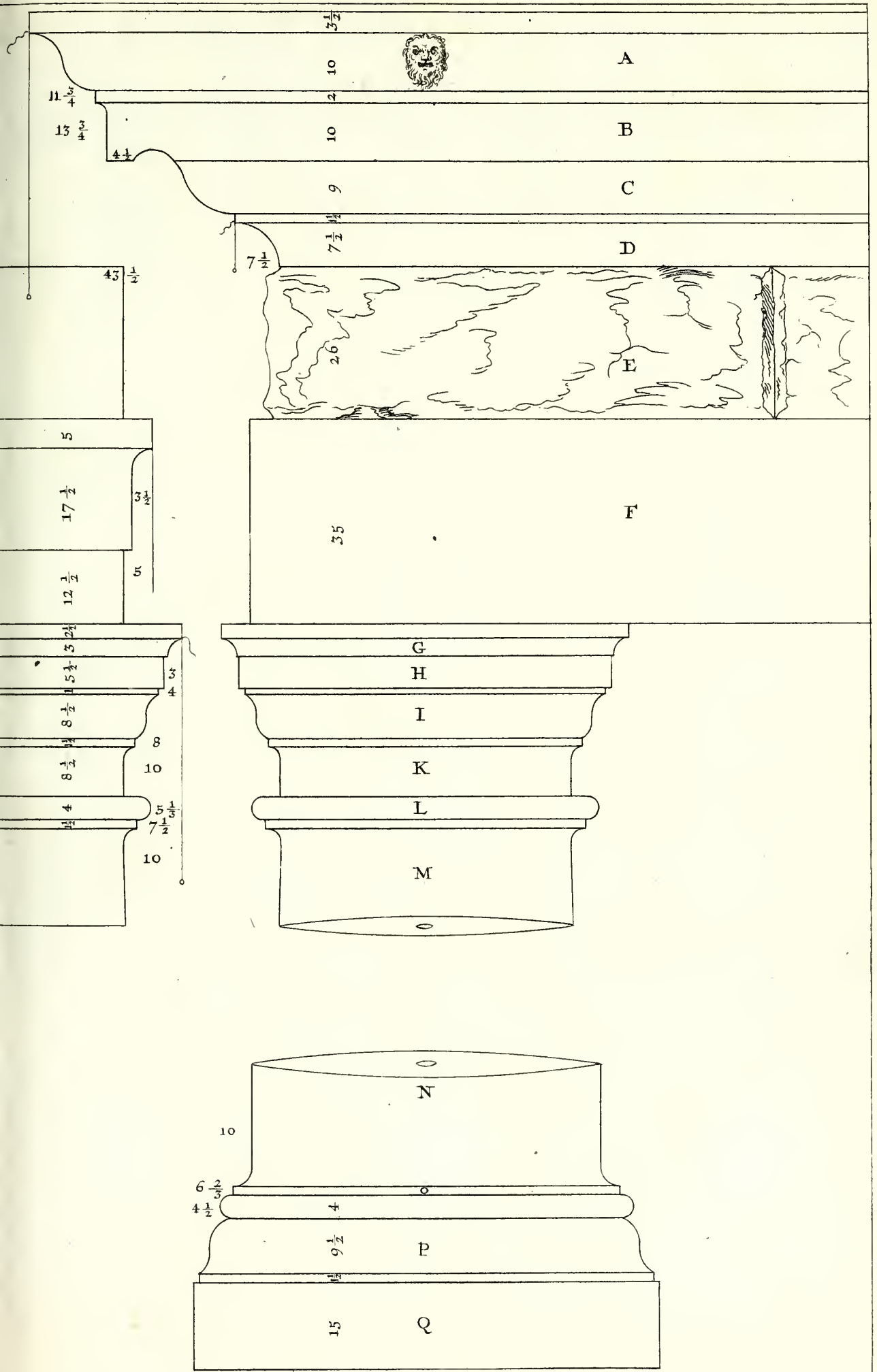
- | | |
|---------------------------------------|---|
| A. <i>Cima recta</i> . | L. <i>Astragal</i> . |
| B. <i>Corona</i> . | M. <i>Shaft of the Column</i>
under the <i>Capital</i> . |
| C. <i>Gutta</i> & <i>Cima recta</i> . | N. <i>Shaft of the Column</i>
at <i>Bottom</i> . |
| D. <i>Cavetto</i> . | O. <i>Listella</i> of the <i>Column</i> . |
| E. <i>Freeze</i> . | P. <i>Torus</i> . } of the |
| F. <i>Architrave</i> . | Q. <i>Orlo</i> . } <i>Base</i> . |
| G. <i>Cymatium</i> , } of the | |
| H. <i>Abacus</i> , } <i>Capit-</i> | |
| I. <i>Cima recta</i> , } <i>tal</i> . | |
| K. <i>Collarino</i> . | |

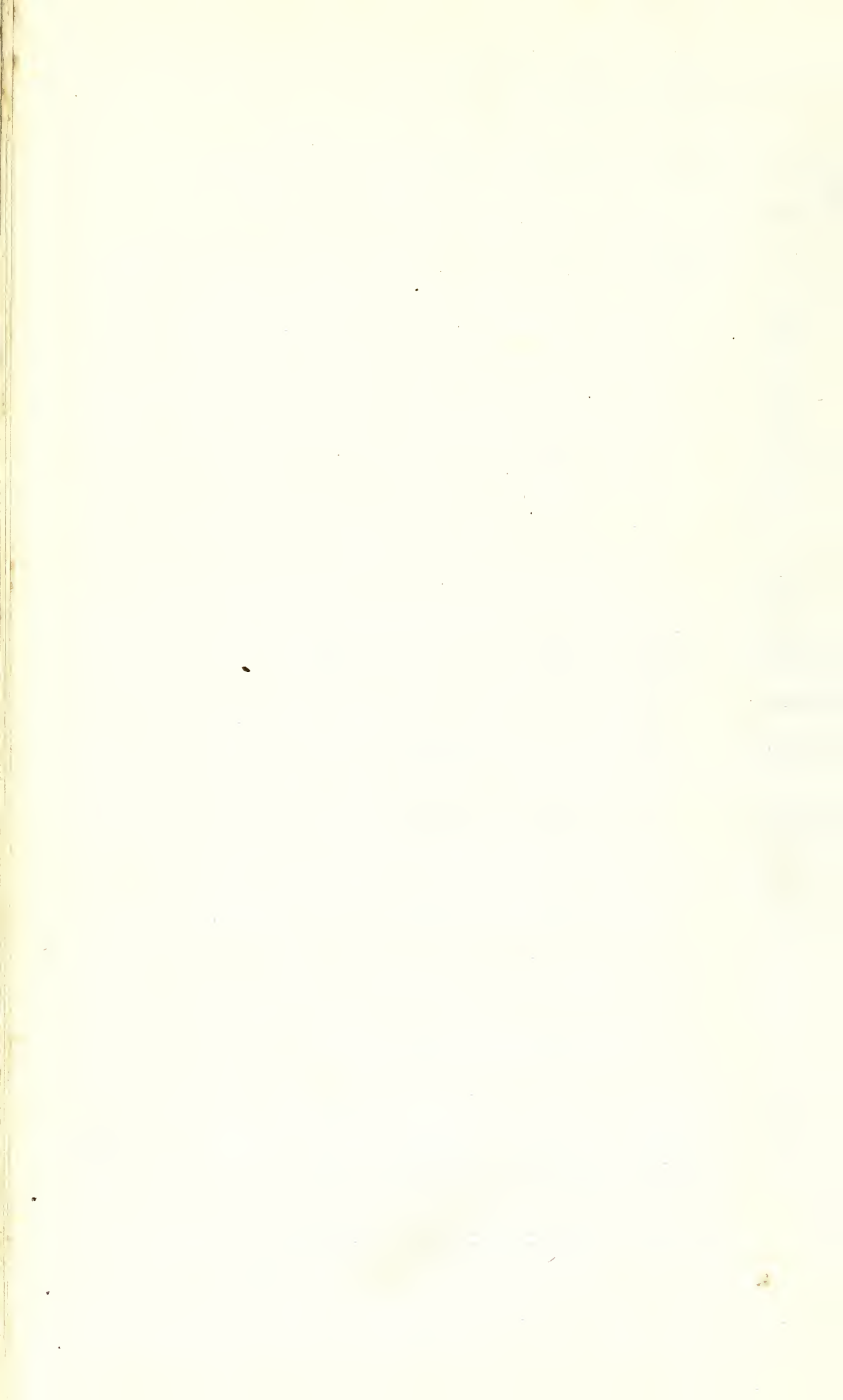
On the Right Hand of the *Profil* of the *Architrave* marked F. the Reader will find the *Profil* of another, performed with greater accuracy.

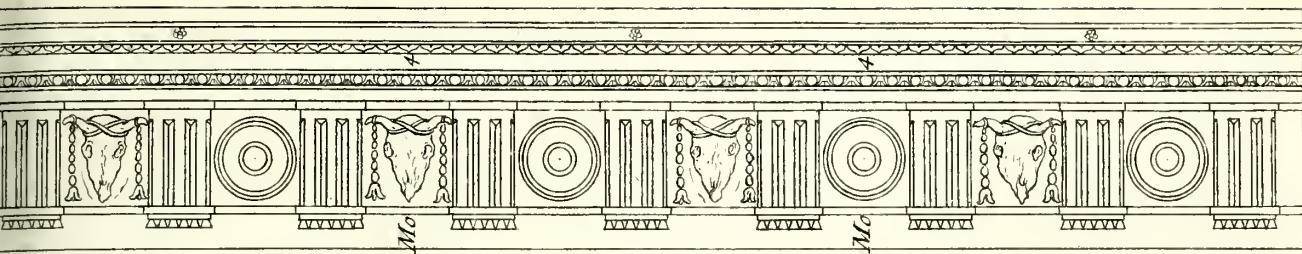
CHAP. XV.

Of the Dorick Order.

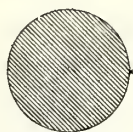
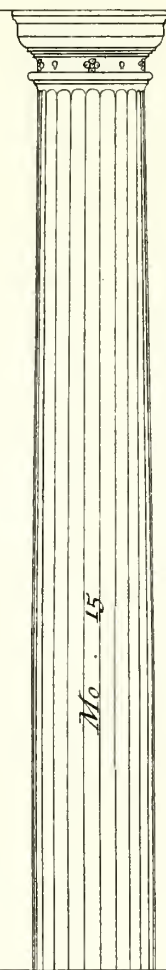
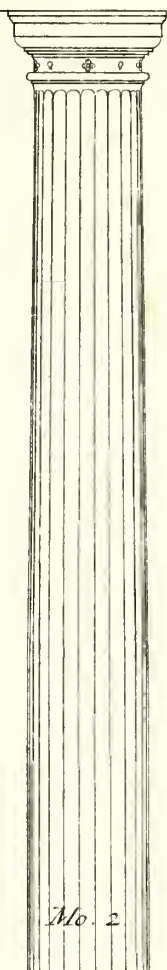
THE *Dorick* Order owes both its Name and Original to the *Dorians*, a Greek People inhabiting *Asia*. If these *Columns* are insular without *Pires*, they







Mo. 5. $\frac{1}{2}$

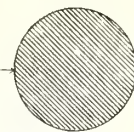


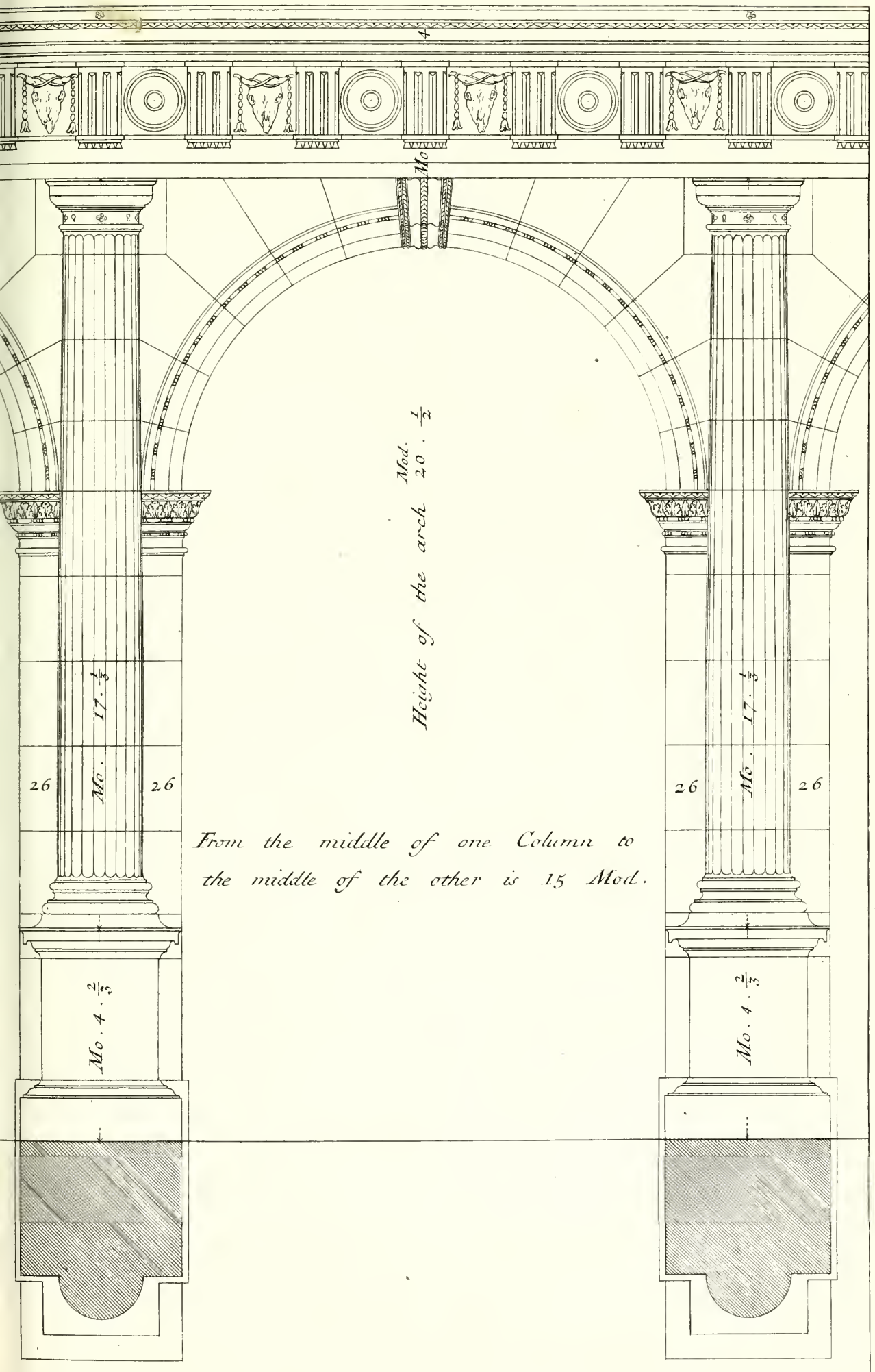
Mo. 5. $\frac{1}{2}$



Mo. 2

Mo. 5. $\frac{1}{2}$





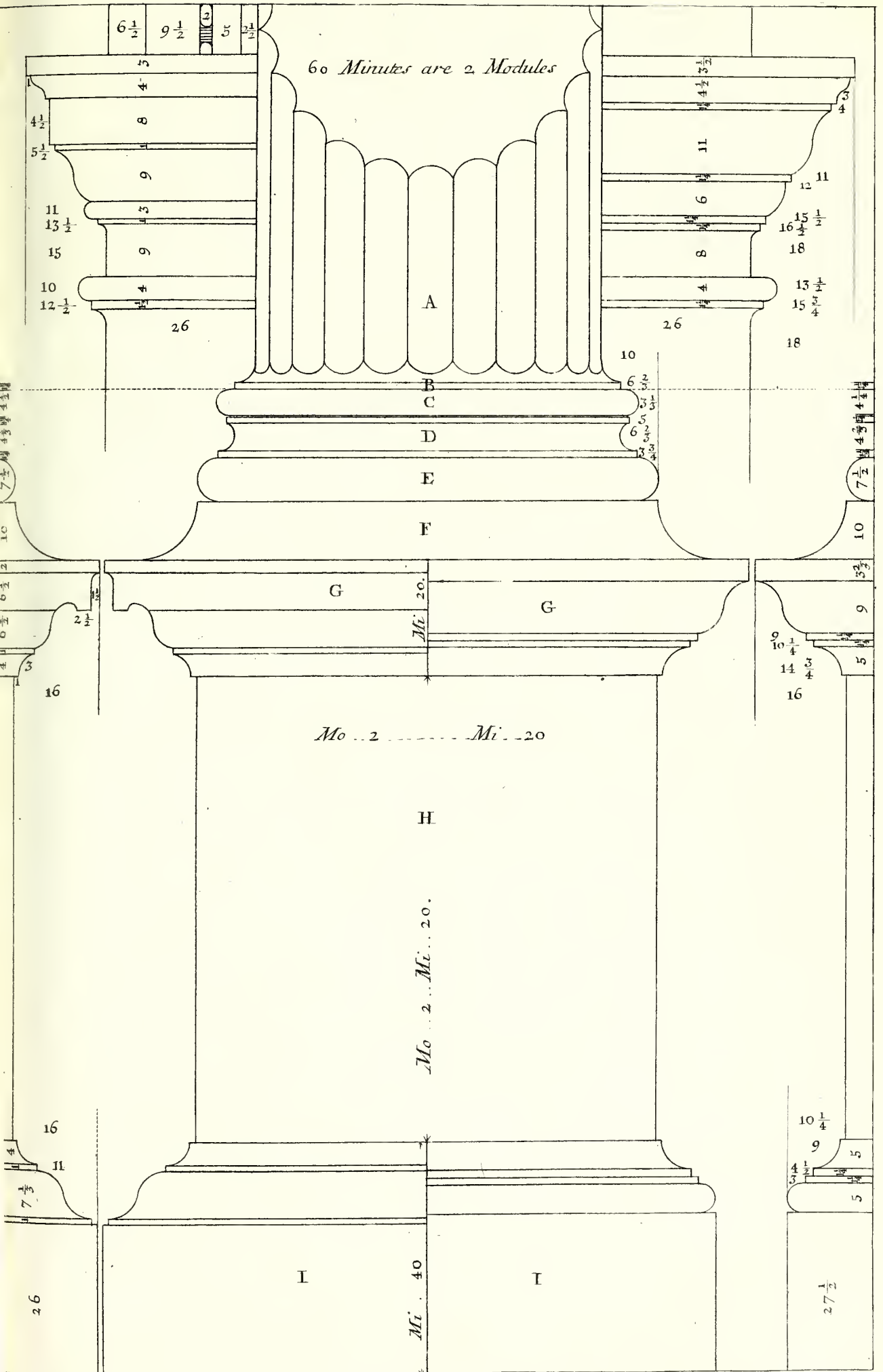
they must be seven Diameters and a half, or eight in length. The *Intercolumniations* are something less than three Diameters of the *Column*, which Manner is called by *Vitruvius*, *Diastylos*. But in case they are joyned to *Pires*, their Altitude must be seventeen *Modules* and one third, including the *Base* and *Capital*; and we must remember, as was before observed in the thirteenth Chapter, that the *Module* in this Order, is but half the Diameter of the *Column*, divided into thirty Minutes; and that in all the other Orders, it is the whole Diameter divided into sixty Minutes.

We do not find that the Antients made any *Pedestal* to this Order, in which they have not been imitated by the *Moderns*. When therefore a *Pedestal* is to be joyned to them, the *Dado* or *Dye* must be square, whence the Measure of its Ornaments must be taken; for it must first be divided into three equal Parts, two of which shall be for the *Base* with its *Plinth*, and the third for the *Cymatium*, to which the *Plinth* of the *Base* of the *Column* must be joyned. Some of these *Pedestals* are found also in the *Corinthian* Order, as in the Arch in *Verona* called the Arch de *Leoni*. I have inserted several kinds of *Profils*, that may be fitted to the *Pedestals* of this Order, all of them beautiful, and taken from the Antients, and measured with the utmost Exactness. This Order has no *Base* peculiar to it, whence it is that these *Columns* are found without *Bases* in several Edifices; as the Theatre of *Marcellus* in *Rome*, the Temple de la *Pietà* near the same Theatre; the Theatre of *Vicenza*, and in several other Places. But the *Attick Base* is sometimes joyned to it, and is very Ornamental; the Measures thereof are as follows: Its height must be half the Diameter of the *Column*, and is divided into three equal Parts; one goes to the *Plinth*; the other two are subdivided into four equal Parts, one of which is for the upper *Torus*, the remaining three are again

subdivided into two equal Parts; one of which is the lower *Torus*, and the other the *Cavetto* with its *Listellas*; these have also their peculiar Measures, and must be divided into six Parts; the first is for the upper *Listella*, the second for the lower, and the four remaining for the *Cavetto*. The whole Projecture is the sixth Part of the Diameter of the *Column*: The *Cincture* is half the upper *Torus*; if it is divided from the *Base*, its Projecture must be one third of that of the *Base*. But if the *Base* and part of the *Column* make one entire Piece, the *Cincture* must be made small, as may be seen in the third Design of this Order, in which I have likewise drawn two different kinds of *Imposts of Arches*.

- | | | |
|--------------------------------------|------------------------------|-----------------------|
| A. <i>Fust of the Column.</i> | F. <i>Plinth.</i> | |
| B. <i>Listella.</i> | G. <i>Cymatium,</i> | } of the
Pedestal. |
| C. <i>Upper Torus.</i> | H. <i>Dado or Dye,</i> | |
| D. <i>Cavetto with its Listella.</i> | I. <i>Base,</i> | |
| E. <i>Lower Torus.</i> | K. <i>Imposts of Arches.</i> | |

The *Capital* must be half the Diameter of the *Column*, and is divided into three Parts; the first is divided into five Parts, whereof three are for the *Abacus*, and two for the *Cymatium*, which being subdivided into three Parts, one goes to the *Listella*, and the other two to the *Cymatium*. The second principal Part is subdivided into three equal Parts; one is for the *Annulets* or Squares, which three are equal; the other two are for the *Ovolo*, whose Projecture is two thirds of its height: The third principal Part is for the *Collarino*. The whole Projecture, is the fifth Part of the Diameter of the *Column*. The height of the *Astragal* is equal to the three *Listellas*, and projects to the lower Part of the *Shaft* of the *Column*. The *Cincture* is half the height of the *Astragal*, and its Projecture is *plum* with the Center thereof. Upon the *Capital* is raised the *Architrave*, whose height



height must be half the Diameter of the *Column*, and is divided into seven Parts; one is for the *Tenia* or *Fillet*, whose Projecture is equal to its height; we afterwards divide the whole into six Parts; one of these is for the *Guttæ*, which must be six in Number, and the *Listella* under the *Tenia*, which is a third Part of the said *Guttæ*. From the *Tenia* downwards, the remainder is again divided into seven Parts; three whereof are for the first *Fascia*, and four for the second. The *Freeze* is a *Module* and a half in height; the breadth of the *Triglyph* is one *Module*, and its *Capital* the sixth Part of a *Module*. The *Triglyph* is divided into six Parts; two of which are for the two Channels in the Middle, one for the two half Channels at the Ends or Extremities, and the other three for the Spaces between the said Channels. The *Metope* that is the Interval between the *Triglyphs*, ought to be a perfect Square. The *Cornice* must be a *Module* and one sixth in height, and is divided into five Parts and a half; two of which are for the *Cavetto* and *Ovolo*. The *Cavetto* is less than the *Ovolo*, just as much as is its *Listella*; the remaining three and a half are for the *Corona* and both the *Cimas*, the *Recta* and the *Reversa*. The Projecture of the *Corona* must be two thirds of a *Module*; and in its Face that looks downward, and has a Projecture along the *Triglyphs*, six *Guttæ* in length, and three in breadth with their *Listellas*, and some *Roses* over the *Metope*. The *Guttæ* are round, and shaped like *Bells*, and answer to those under the *Tenia*. The Body of the *Cymatium*, must be an eighth Part larger than the *Corona*, and is divided into eight Parts; two whereof are for the *Plinth*, and the other six for the *Cymatium*, whose Projecture is seven Parts and a half. So that the height of the *Architrave*, the *Freeze* and *Cornice*, are a fourth Part of the Altitude of the *Column*. These are the Measures of the *Cornice* according to *Vitruvius*, from which I have deviated, by altering
some

some Members thereof, and making the whole a little larger.

- A. *Cima recta.*
- B. *Cima reversa.*
- C. *Corona.*
- D. *Ovolo.*
- E. *Cavetto.*
- F. *Capital of the Triglyph.*
- G. *Triglyph.*
- H. *Metope.*
- I. *Tenia or Fillet.*
- K. *Gutta.*
- L. *First Fascia.*
- M. *Second Fascia.*

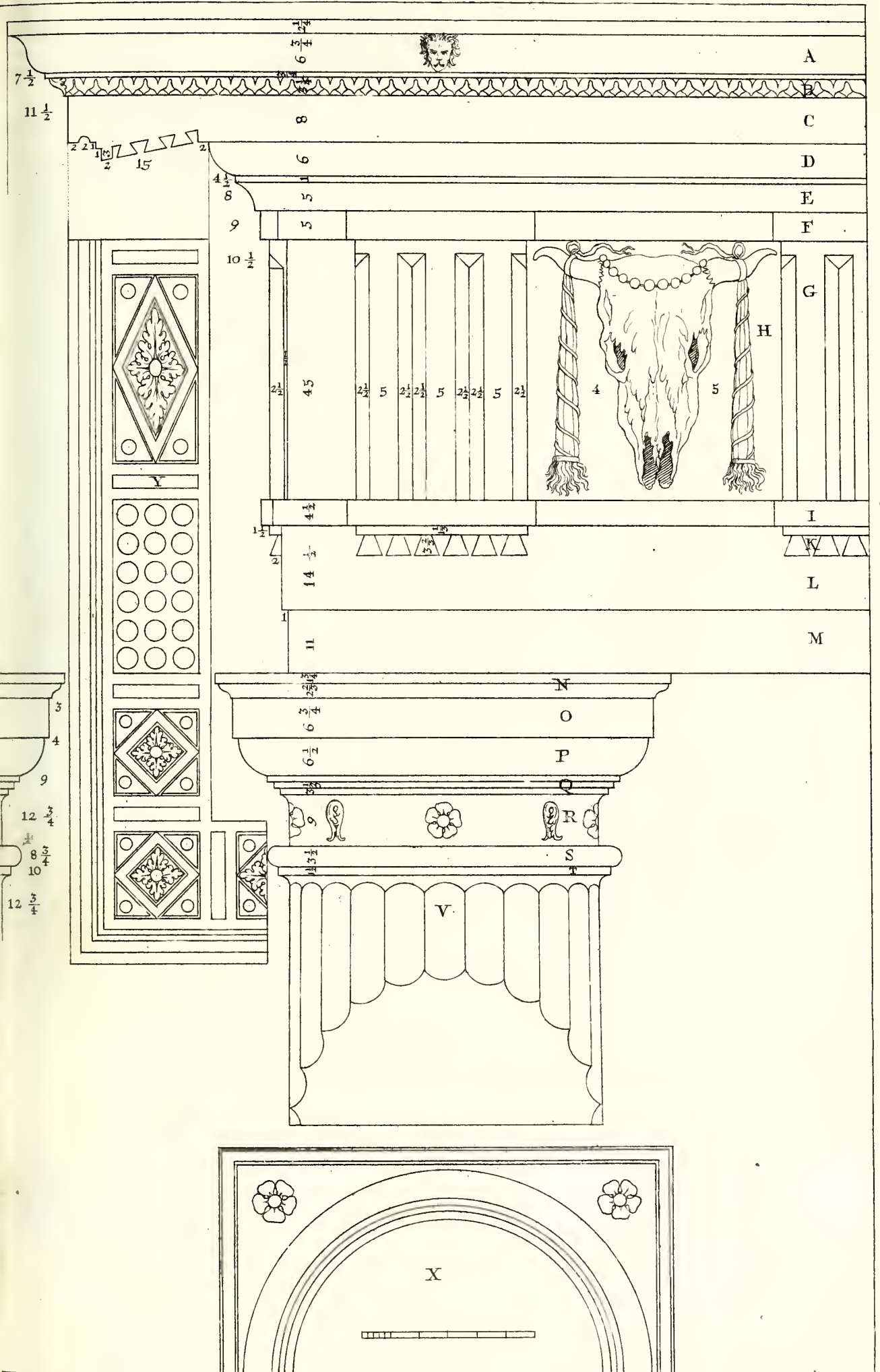
Parts of the *Capital.*

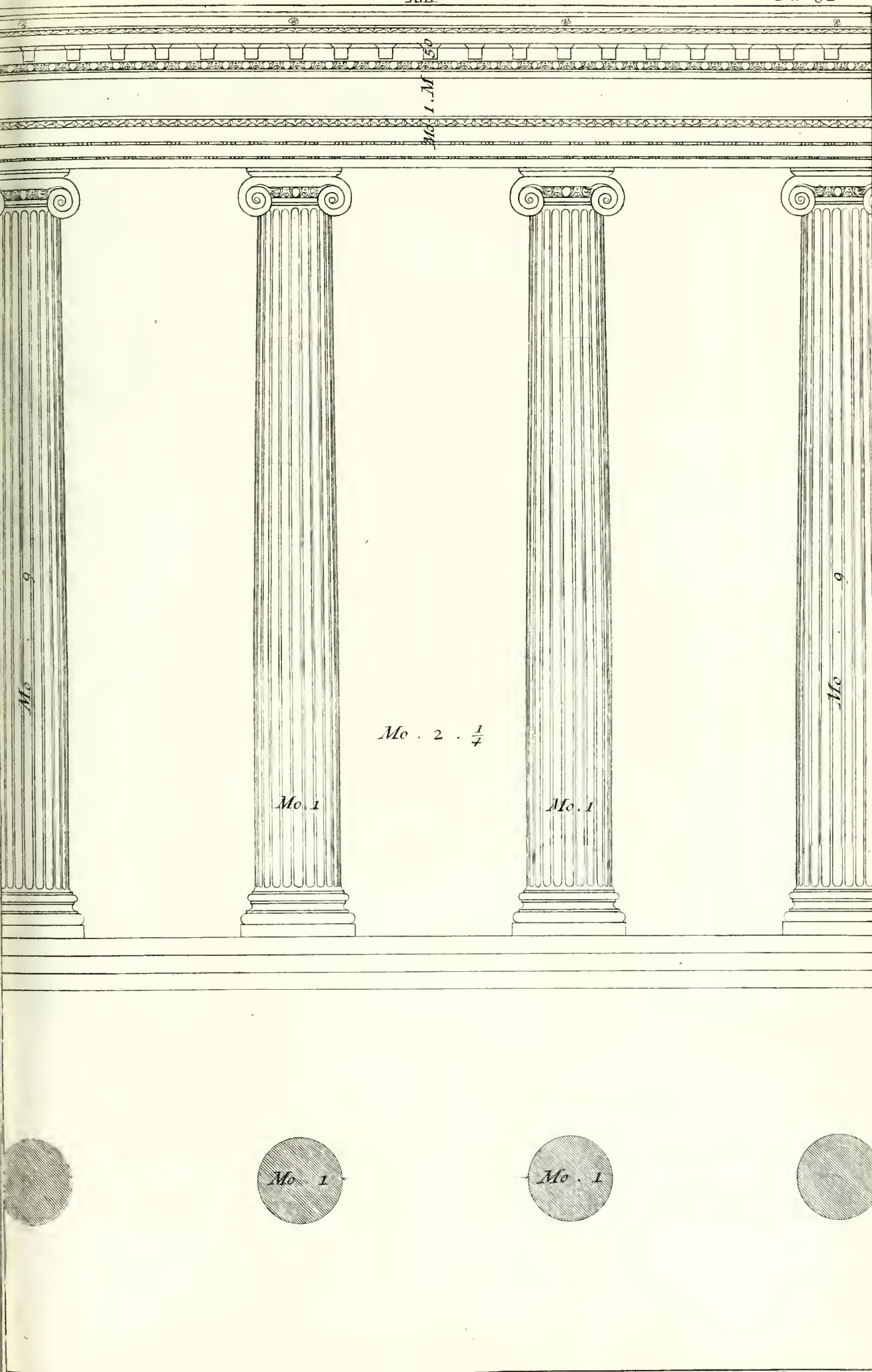
- N. *Cymatium.*
- O. *Abacus.*
- P. *Ovolo.*
- Q. *Listellas, or little Mouldings.*
- R. *Collarino.*
- S. *Astragal.*
- T. *Cincture.*
- U. *Fust of the Column.*
- X. *Plan of the Capital; and the Module divided into Thirty Parts or Minutes.*
- Y. *Soffit of the Cornice.*

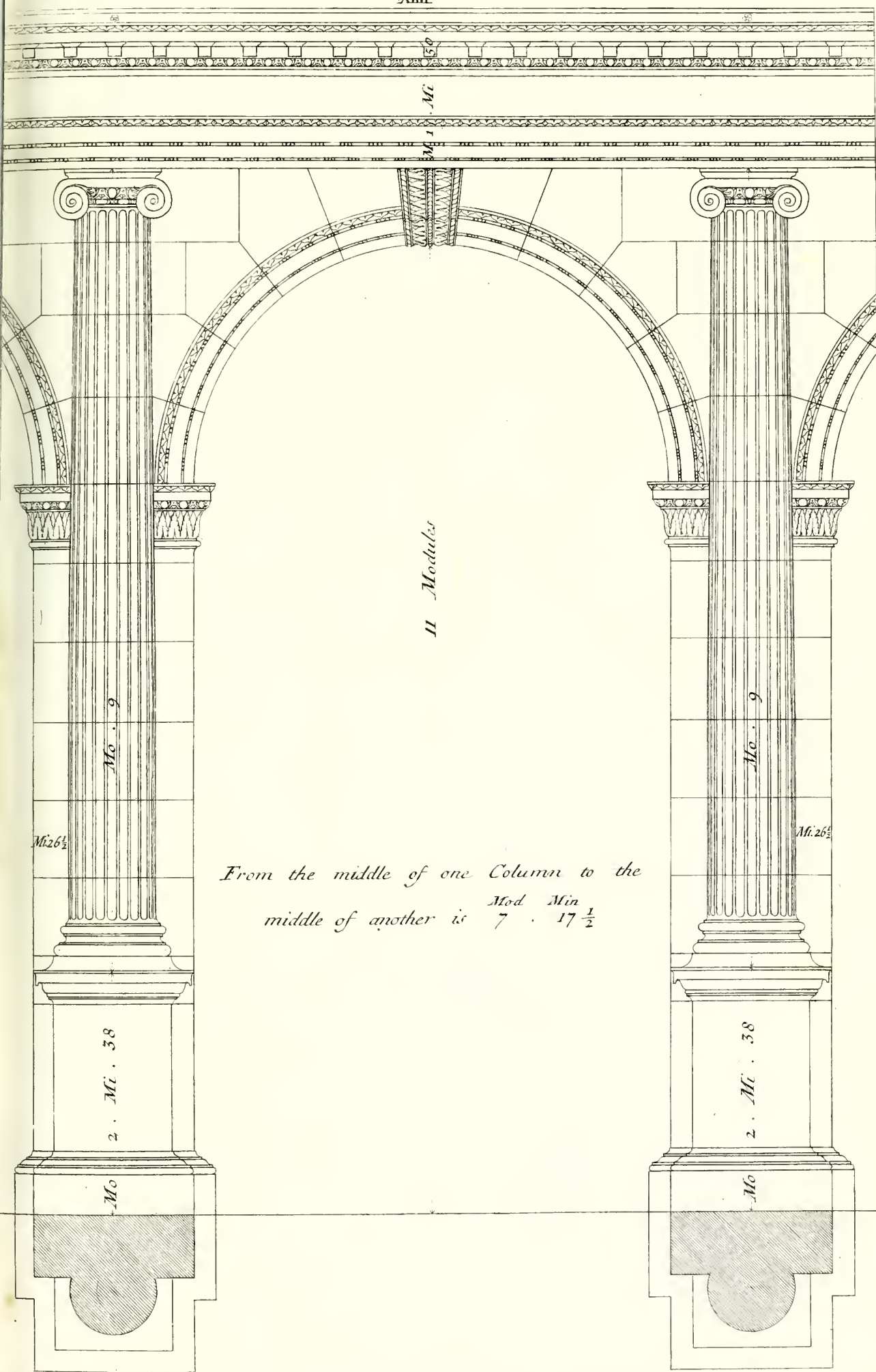
C H A P. XVI.

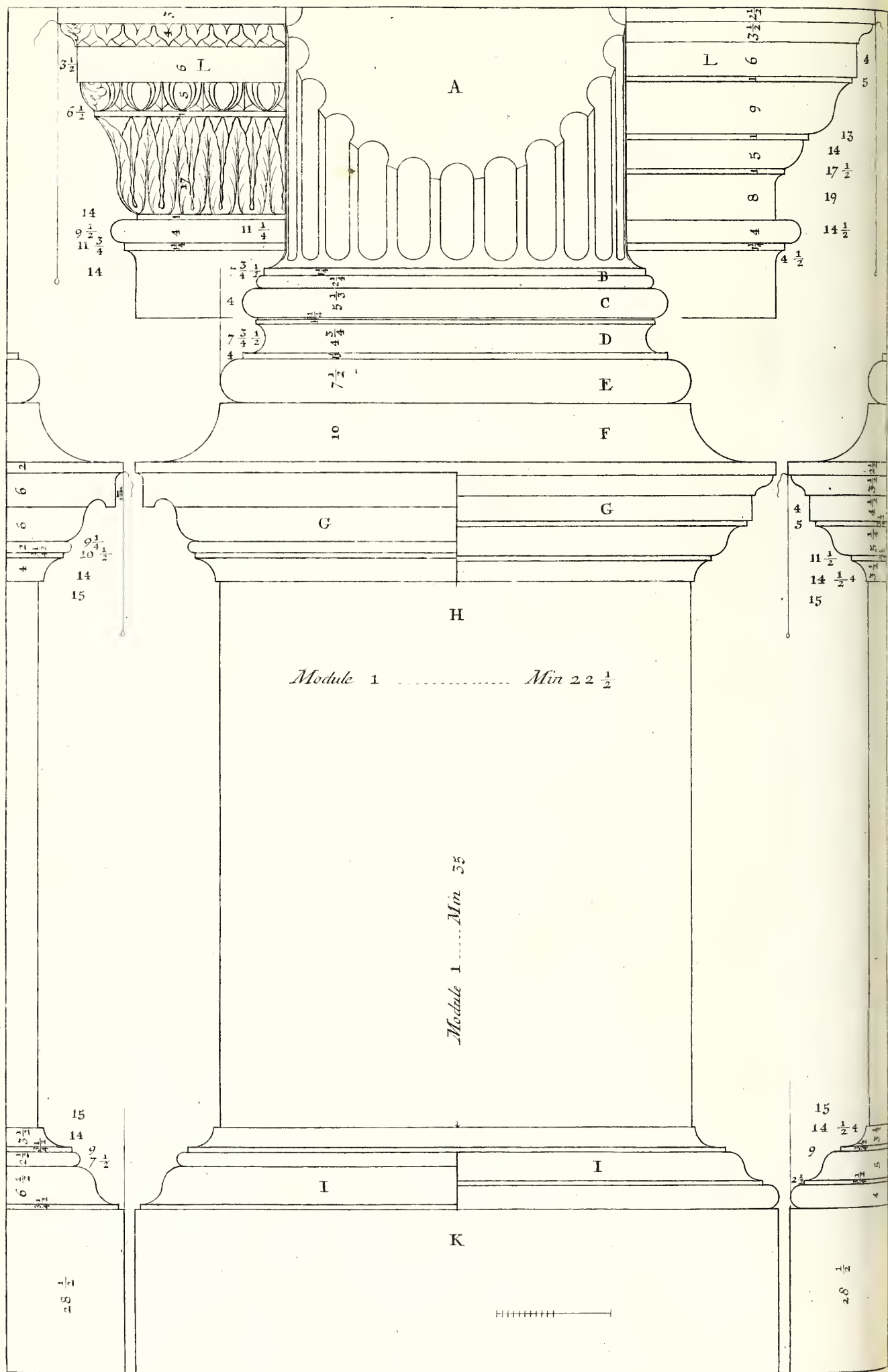
Of the Ionick Order.

THE *Ionick* Order had its origin from *Ionia*, a Province in *Asia*; and History informs us that the celebrated Temple of *Diana* at *Ephesus* was of this Order. The *Column* with its *Capital* and *Base*, must be nine *Modules* in height; a *Module*, as was before observed, is the Diameter of the *Column* below. The *Architrave*, *Freeze*, and *Cornice*, are a fifth part of the Altitude of the *Column*; in the Design of single *Columns*, the *Intercolumniations* are two Diameters and a Quarter, which are the most commodious and beautiful, and is called *Eustylos* by *Vitruvius*. In the Design of the *Arches*, the *Piers* are a third part of the Void, and the *Arches* have two Diameters in height.









If *Pedestals* are to be given to the *Ionick Columns*, as in the *Designs* of the *Arches*, their *Altitude* must be equal to half the breadth of the *Opening* of the *Arch*, and is divided into seven Parts and a half; two whereof are for the *Base*, one for the *Cymatium*, and the remaining four and a half for the *Dado*. The *Base* of the *Ionick Order*, must be half a *Module* in thickness, and is divided into three Parts; one is given to the *Plinth*, whose *Projecture* is the fourth, and an eighth Part of the *Module*; the other two are divided into seven Parts, three of which are for the *Torus*; the other four are again subdivided into two Parts; of one is made the upper *Cavetto*, and of the other the lower, which must have the greatest *Projecture*. The *Astragals* must be the eighth of the *Cavetto*; the *Cincture* of the *Column* is the third Part of the *Torus* of the *Base*; but if the *Base* be joyned to the *Column*, the *Cincture* must be smaller, as was before observed in the *Dorick Order*. The *Projecture* of the *Cincture* is half of that abovementioned. These are the several Measures of the *Ionick Base*, according to *Vitruvius*.

But as we find the *Attick Base*, placed under this Order in a great many antient Edifices, which indeed I think better; I have therefore drawn the said *Base* over the *Pedestal*, with a little *Torus* under the *Cincture*; but at the same Time have not omitted the *Design* which *Vitruvius* has given us. The *Designs* marked *L*, are two different *Profils* to make the *Imposts* of the *Arches*, and on each of them the Measures are set down in Numbers, denoting the Minutes of the *Module*, as has been observed in all my other *Designs*. These *Imposts* are half as high again, as the thickness of the *Pilaster* that supports the *Arch*.

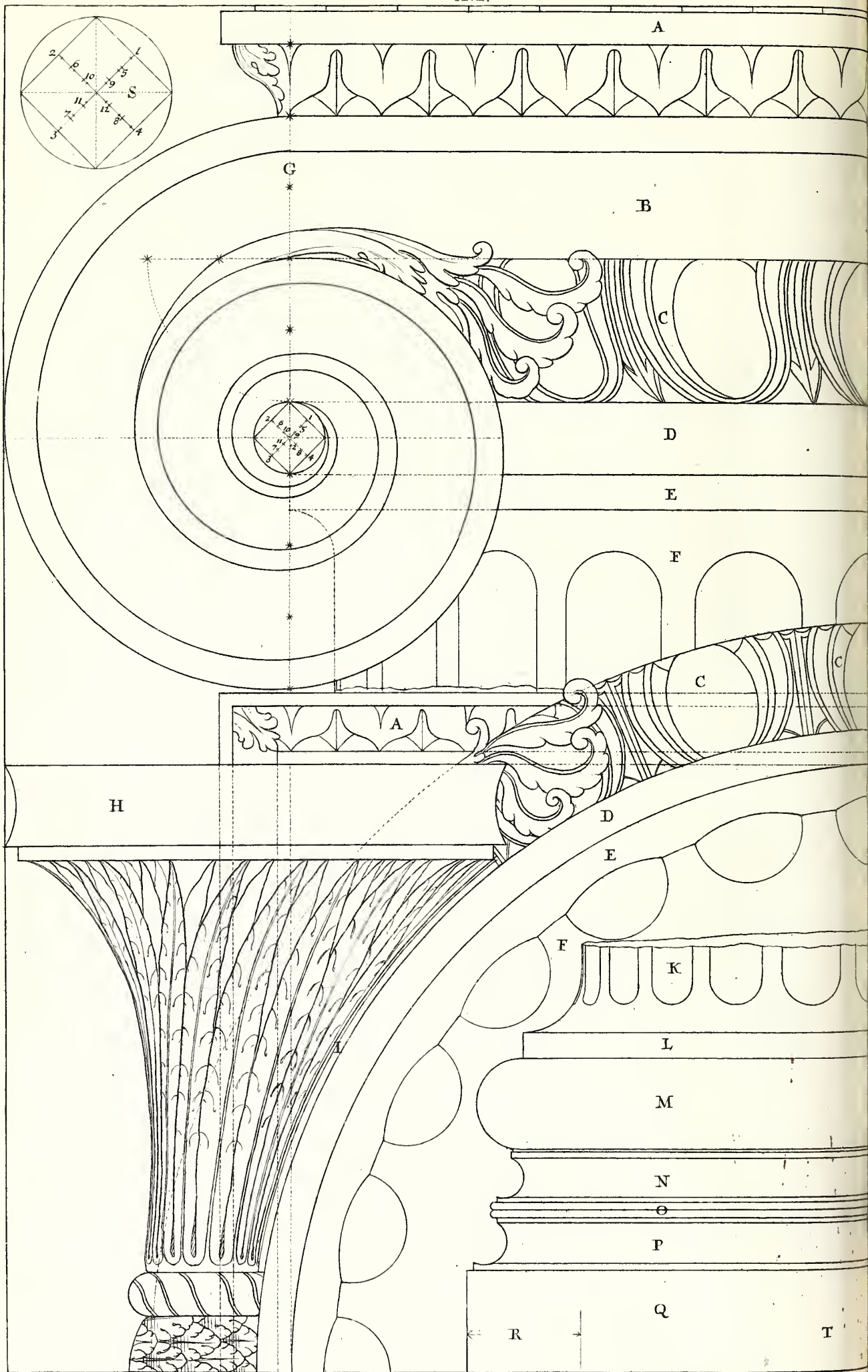
- | | |
|---|---|
| A. Shaft of the Column. | C. Upper Torus. |
| B. Astragal with its Cincture, which are Members of the Column. | D. Cavetto. |
| | E. Lower Torus. |
| | F. Plinth joyned to the Cymatium of the Pedestal. |

K

G. Cy-

G. <i>Cymatium in two different Forms.</i>	} of the	K. <i>Plinth of the Base.</i>
H. <i>Dado.</i>		L. <i>Imposts of the Ar-</i>
I. <i>Base in two different Forms.</i>		<i>ches.</i>

To make the *Capital*, the Diameter at the Foot of the *Column* is divided into eighteen Parts, and nineteen of such parts make the length and breadth of the *Abacus*; half of which is the height of the *Capital* with its *Volutes*, whence its Altitude will be nine parts and a half; one and a half of which is given to the *Abacus* with its *Cymatium*, and the remaining eight to the *Volute*, which is made in this Manner. From the Extremity of the *Cymatium* inward, one of the nineteen Parts is taken, and from the Point made, a *plum* Line is let fall, which divides the *Volute* in the Middle, and is called *Catheto*. Where the Point falls upon this Line, that separates the four Parts and a half above, from the three and a half below, the Center of the Eye of the *Volute* is made, whose Diameter is one of the eight Parts; and from the above-mentioned Point, a Line is drawn, which cutting the *Catheto* at right Angles, divides the *Volute* into four Parts. In the next place a Square is made in the Eye of the *Volute*, as big as the Semi-Diameter of the said Eye; and Diagonal Lines being drawn, on them the Points are marked, where the fixed Foot of the Compass is to stand, to make the *Volute*; which Points or Centers, including that of the Eye, are thirteen in Number; and in what manner these are to be performed, will appear by the Numbers marked in the Design. The *Astragal* of the *Column*, is in a direct Line with the Eye of the *Volute*. The thickness of the *Volutes* in the middle, must be equal to the Projecture of the *Ovolo*,



Ovolo, which must come forward beyond the *Abacus*, just as much as is the Eye of the *Volute*. The *Channel* of the *Volute*, is even with the *Shaft* of the *Column*. The *Astragal* of the *Column* goes under the *Volute*, and is always exposed to sight, as appears by the *Plan*; and indeed it is natural that so thin and weak a Member, as the *Volute* is supposed to be, should give way to a stronger one such as the *Astragal*, from which it must be equally distant. In the Angles of Colonnades, or Portico's of the *Ionick* Order, we generally make *Capitals* with *Volutes*, not only in the *Front*, but also in that part, which if the *Capital* were to be made as usual, would have been the *Flank*; by which means they have the *Front* on two Sides, and are called *Angular Capitals*; how these are made, will be shewn in my *Book of Temples*, which is the Fourth of this Work.

A. *Abacus*.

B. *Channel or Hollow of the Volute*.

C. *Ovolo*.

D. *Astragal under the Ovolo*.

E. *Cincture*.

F. *Shaft of the Column*.

G. *The Line called Capital*.

In the *Plan* of the *Capital*, the said Members are marked with the same Letters.

S. *Eye of the Volute on a large Scale*.

Members of the Base according to Vitruvius.

K. *Fust of the Column*.

L. *Cincture*.

M. *Torus*.

N. *First Cavetto*.

O. *Astragal*.

P. *Second Cavetto*.

Q. *Plinth*.

R. *Projecture*.

The *Architrave*, *Freeze*, and *Cornice*, must be, as was before observed, a fifth part of the height of the *Column*, and is divided into twelve parts; four of which are for the *Architrave*, three for the

the *Freeze*, and five for the *Cornice*. The *Architrave* is subdivided into five parts; one of which is for the *Cymatium*, and the rest are again divided into twelve parts; three whereof are for the first *Fascia* and its *Astragal*, four for the second and its *Astragal*, and five for the third. The *Cornice* is divided into seven parts and three fourths; two are for the *Cavetto* and *Ovolo*; two for the *Modilion*, and three and three fourths for the *Corona* and the *Cymatium*; the Projecture of the whole *Cornice* is equal to its height. I have designed the *Front*, *Flank*, and *Plan* of the *Capital*; as also the *Architrave*, *Freeze*, and *Cornice*, with their proper Ornaments.

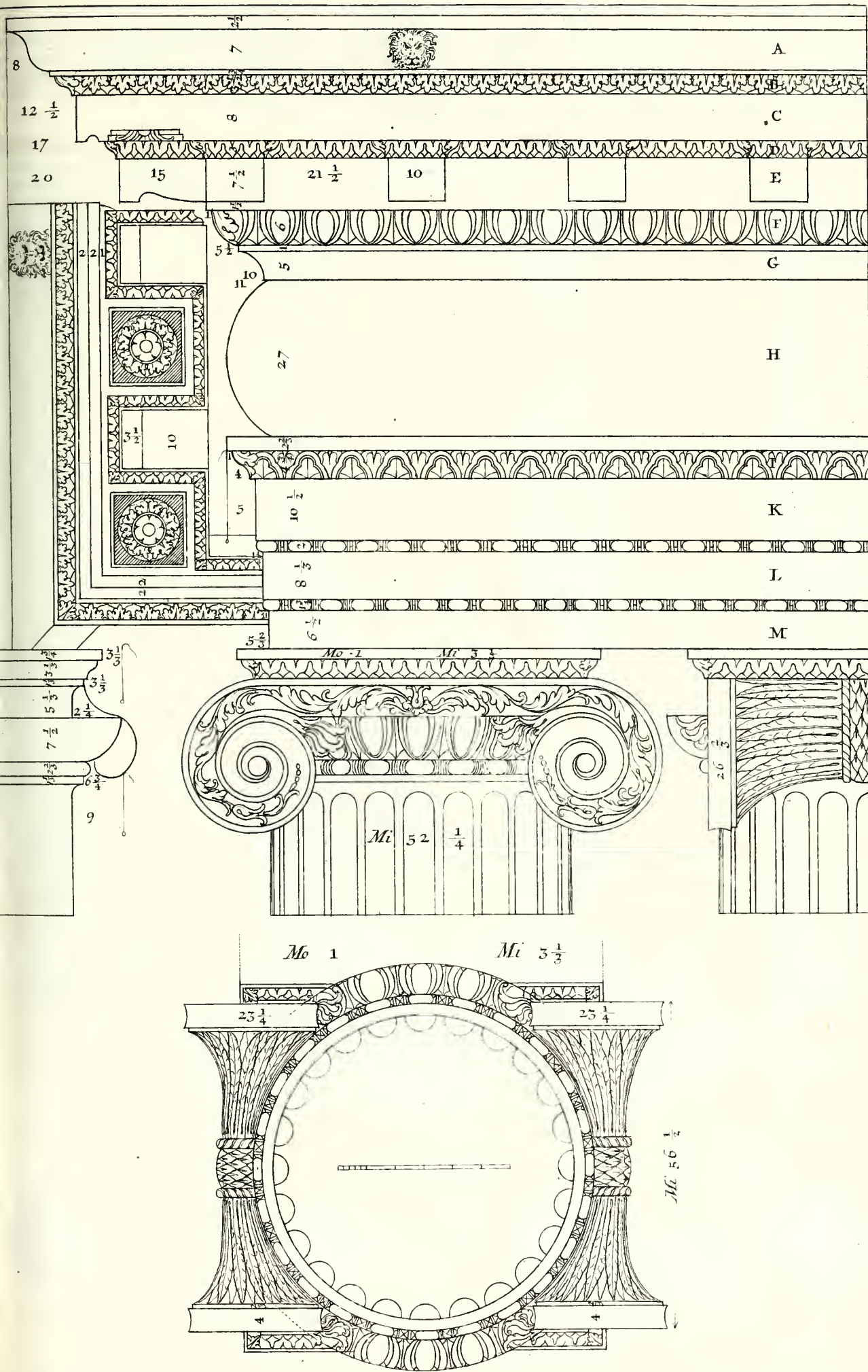
- | | |
|--------------------------------------|---------------------------------------|
| A. <i>Cima recta.</i> | G. <i>Cavetto.</i> |
| B. <i>Cima reversa.</i> | H. <i>Freeze.</i> |
| C. <i>Corona.</i> | I. <i>Cymatium of the Architrave.</i> |
| D. <i>Cymatium of the Modilions.</i> | K. <i>First Fascia.</i> |
| E. <i>Modilions.</i> | L. <i>Second Fascia.</i> |
| F. <i>Ovolo.</i> | M. <i>Third Fascia.</i> |
| Members of the Capital. | |
| N. <i>Abacus.</i> | Q. <i>Astragal of the Column.</i> |
| O. <i>Hollow of the Volute.</i> | R. <i>Fust of the Column.</i> |
| P. <i>Ovolo.</i> | |

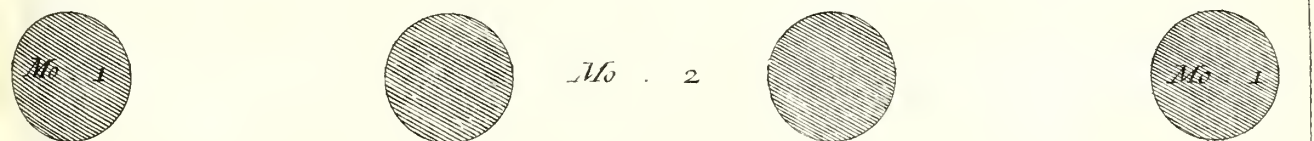
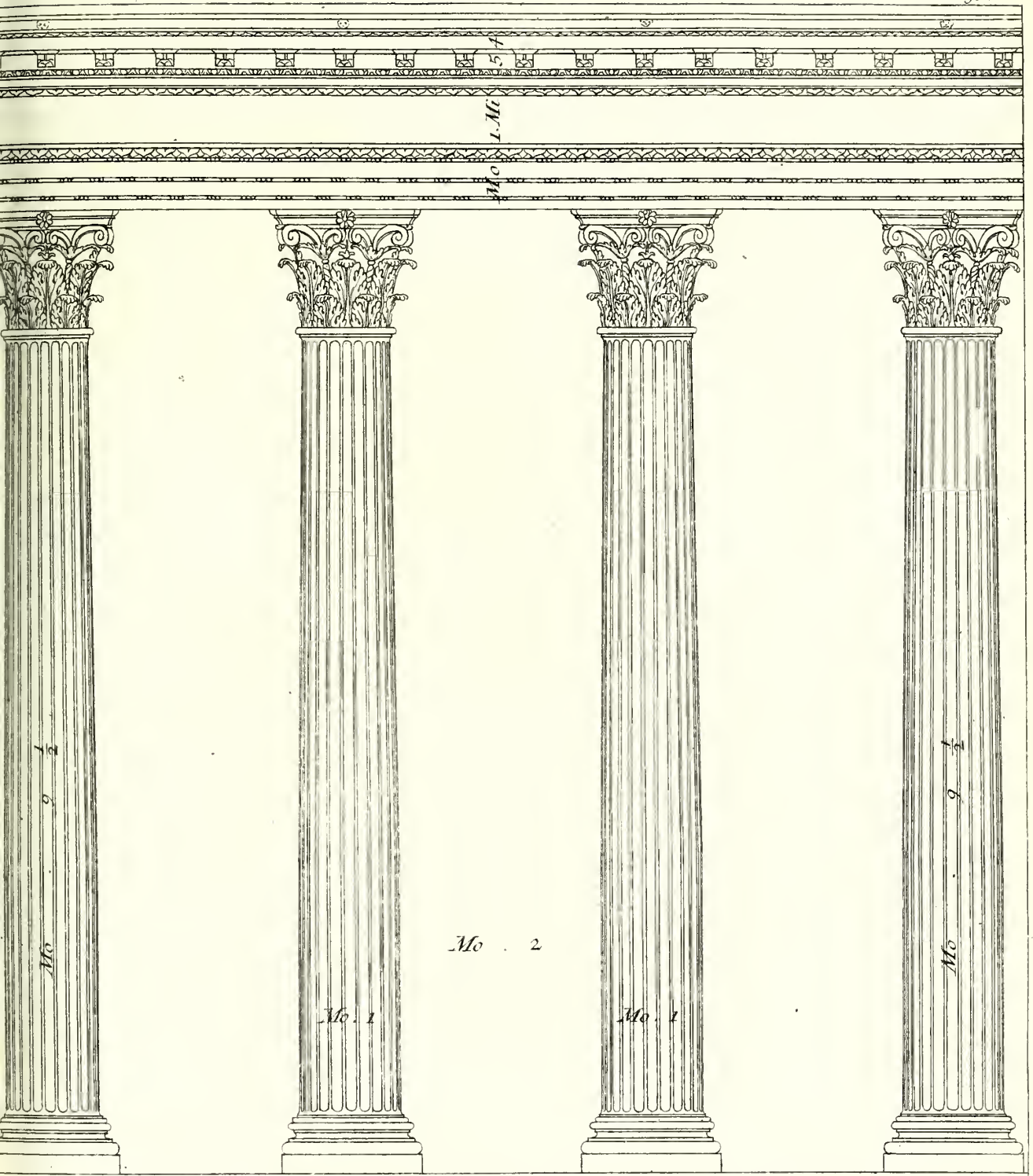
The *Plan* marked S, wherein we see the *Roses*, represents the *Soffit* of the *Cornice* between each *Modilion*.

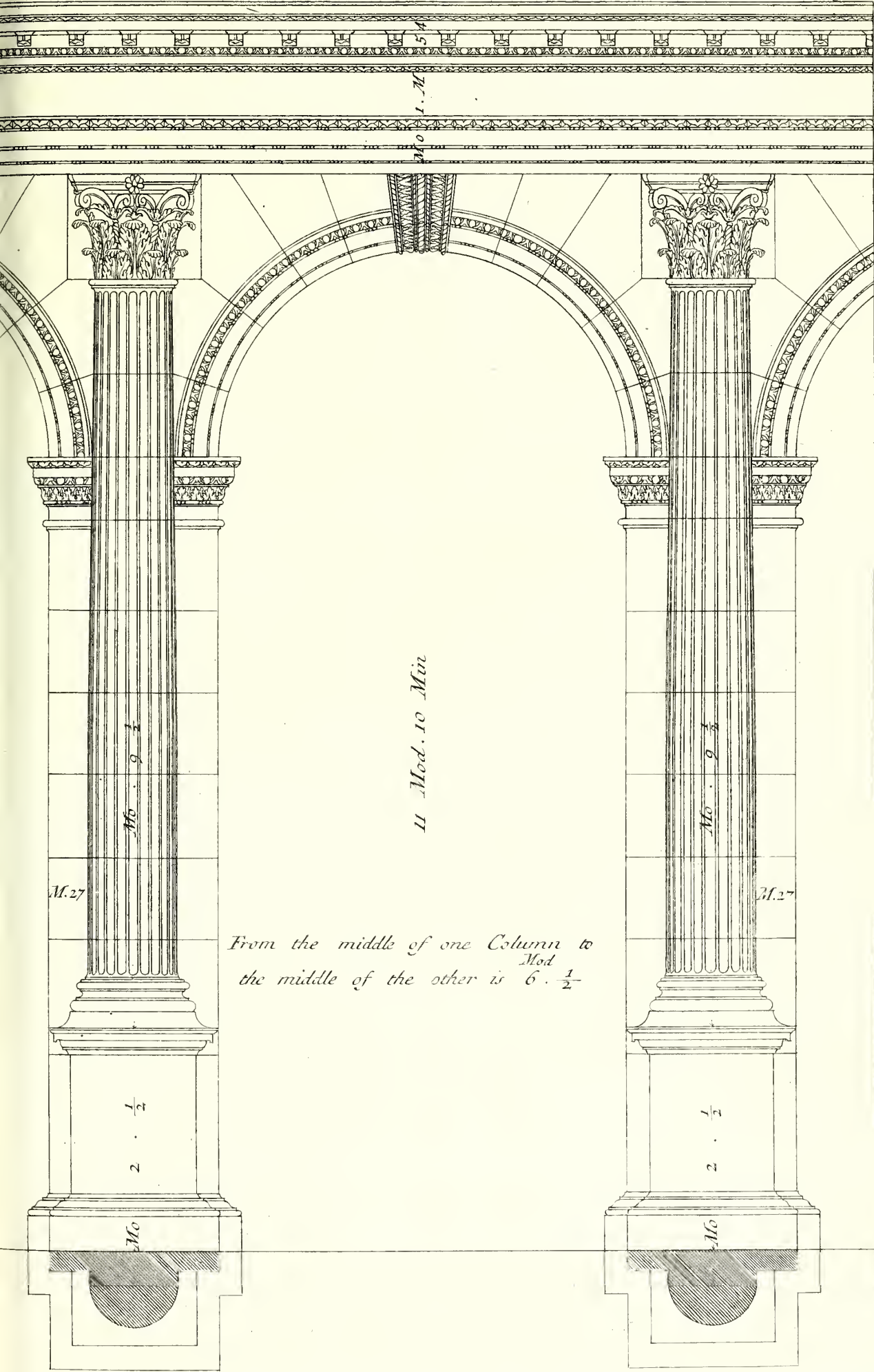
C H A P. XVII.

Of the Corinthian Order.

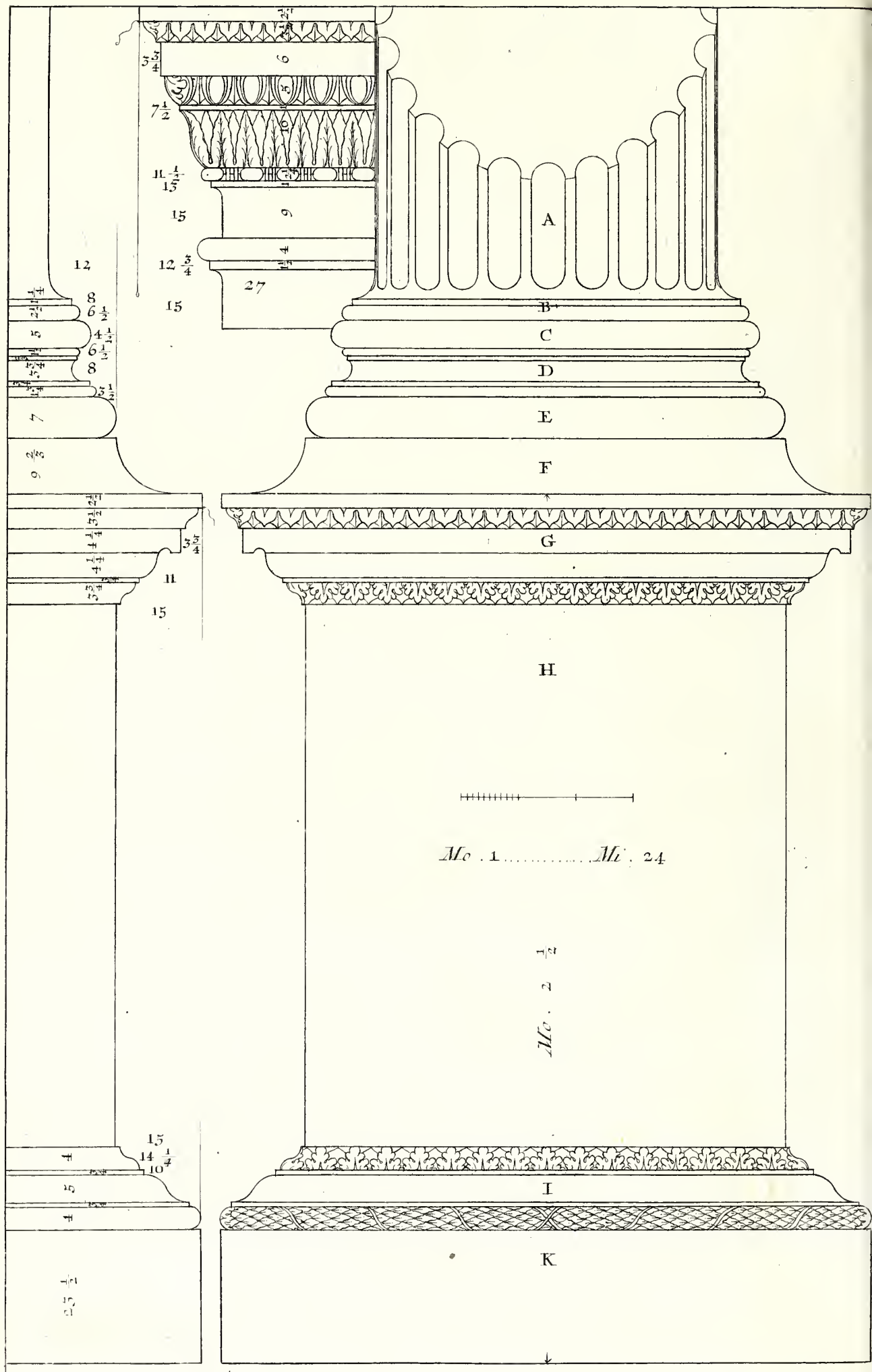
IN *Corinth*, a celebrated City of *Peleponnesus*, the *Corinthian* Order was invented, which is more beautiful and elegant than the foregoing. The *Columns* thereof are like those of the *Ionick*, and are nine *Modules*











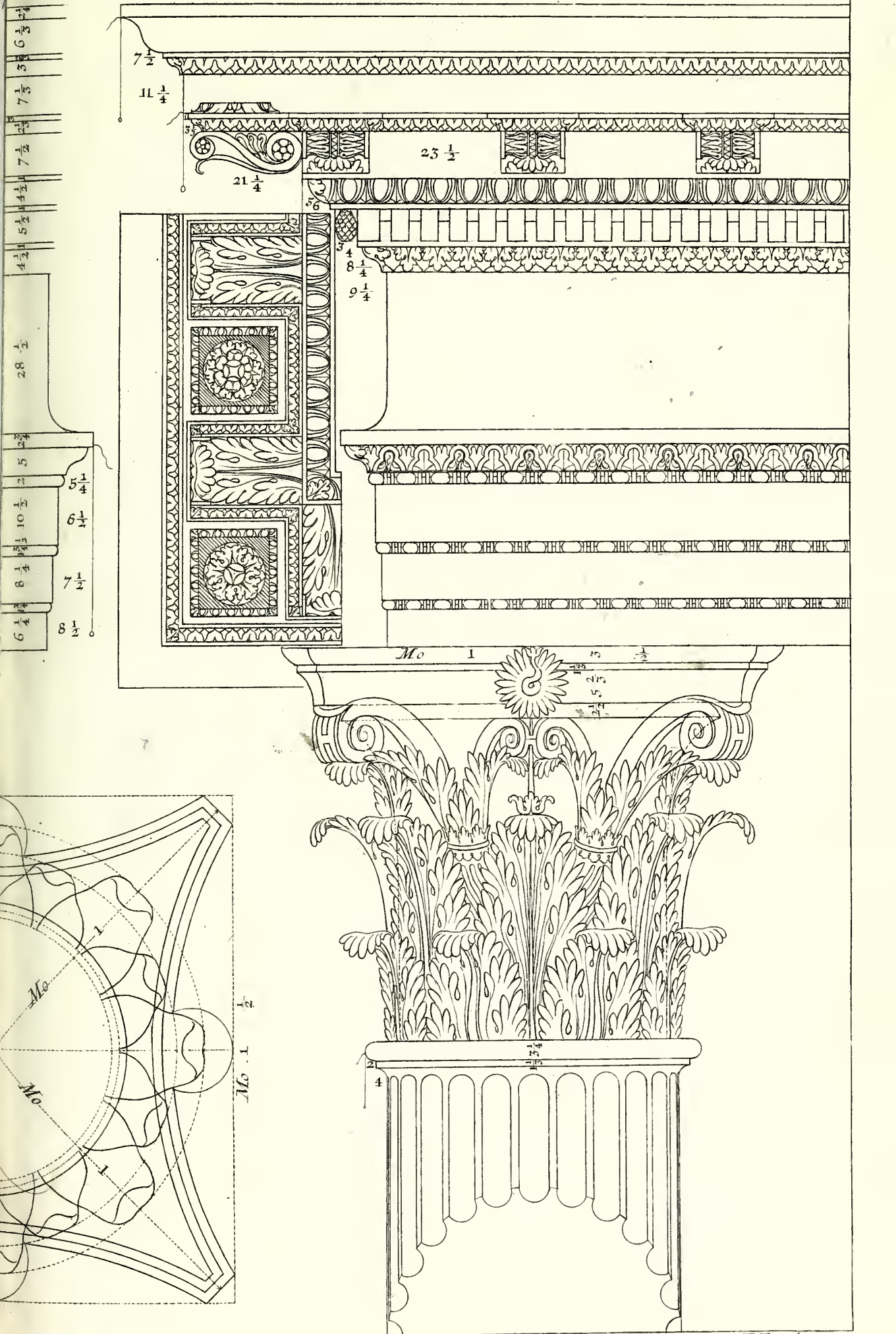
Modules and a half in height, including their *Base* and *Capital*. If they are to be fluted, they must be made with twenty four *Flutes* or Hollows, whose depth is equal to half their breadth. The *Plans* or Spaces between two *Flutes*, must be one third of the breadth of the said *Flutes*. The *Architrave*, *Freeze* and *Cornice*, are a fifth of the height of the *Column*. In the Design of a *Colonnade* or single *Columns*, the *Inter-columniations* are two Diameters, as in the Portico of *Santa Maria^{the} Rotunda* in *Rome*, which manner of distancing the *Columns*, *Vitruvius* calls *Systylos*. And in that of the *Arches*, the *Pires* are two fifths of the Opening of the *Arch*, whose Opening is in height, two Squares and a half, including the thickness of the said *Arch*.

The height of the *Pedestal* in this Order, must be one fourth of the Altitude of the *Column*, and is divided into eight Parts; one is for the *Cymatium*, two for the *Base*, and the remaining five for the *Dado*. The *Base* being divided into three Parts; two go to the *Plinth*, and one to the *Mouldings*. This *Column* has the *Attick Base*, but differs from that which is set under the *Dorick* Order, in that its Projecture is one fifth Part of the Diameter of the *Column*. Some other little Variations may be made, as is seen in the Designs, wherein the *Imposts* of the *Arches* are also profil'd, whose height is half as much again as the thickness of the *Alett*, or *Pire* that supports the *Arch*.

- | | | |
|--------------------------------|-----------|------------------------|
| A. Shaft, | } of the | joyned to the Cyma- |
| B. Cincture and Astragal, | | |
| C. Upper Torus. | } Column. | stal. |
| D. Cavetto with its Astragals. | | |
| E. Lower Torus. | } of the | Ped- |
| F. Plinth of the Base | | |
| | } Base, | stal. |
| | | |
| | | K. Plinth of the Base. |

The *Imposts* of the *Arches* is by the side of the *Column*.

The Altitude of the *Corinthian Capital*, must be the Diameter of the *Column* below, and a sixth part more, which is allowed to the *Abacus*; the remainder is divided into three equal parts; the first is for the first Row of *Leaves*, the second for the middle Row, and the third is again subdivided into two parts; of that part which is nearest the *Abacus*, are made the *Caulicoli* or *Stalks*, with their *Leaves*, which seem to be supported by them, and out of which they grow; for which reason the *Fust* or *Stalk* whence they spring should be thick, and diminish by small degrees in their foldings; thereby imitating Plants, which are thicker at the Bottom than at the Extremities of their Branches. The *Campana* or *Bell*, that is the *Fust* of the *Column* under the *Leaves*, must be perpendicular to the Bottom of the *Flutes* of the *Columns*. To give the *Abacus* a proper Projecture, a perfect Square must be made, the Side of which is a *Module* and a half; and Diagonal Lines being drawn in it, the Point of their Intersection will be in the Middle or Center; here the fixed Foot of the Compass must be placed, and a *Module* marked towards each Angle of the Square; and where these Points meet, Lines are drawn that cut the said Diagonals at right Angles, and so as to touch the Sides of the Square, and these shall be the bounds of the Projecture, whose length gives the breadth of the Horns of the *Abacus*. Its Curvature or Diminution, is made by drawing a circular Line from one Horn to the other, and in marking the Point; by which an Equilateral Triangle is made, whose *Base* is the Diminution. Afterwards a right Line is drawn from the Extremities of the above-mentioned Horns, to the Extremity of the *Astragal* of the *Column*, which must be made in such a manner, as to be touched by the Tips, or Extremities of the *Leaves*, or else come a little more forward; and this will be their Projecture. The *Rose* must be



be a fourth part as broad, as the Diameter of the *Column* at the Foot. The *Architrave*, *Freeze* and *Cornice*, as was before observed, are a fifth part of the height of the *Column*, and the whole is divided into twelve parts as in the *Ionick*, but differs from it in this, *viz.* that the *Cornice* of the *Corinthian* is divided into eight parts and a half; the first is allowed to the *Cima Reversa*, the second to the *Denticles*, the third to the *Ovolo*, and the fourth and fifth to the *Modilion*, and the remaining three and a half to the *Corona* and the *Cymatium*. The Projection of the *Cornice* is equal to its height. The Pannels of the *Roses* between the *Modilions* must be square, and the *Modilions* half as broad as the *Plan* of the said *Roses*. The Members of this Order, are not marked by Letters as the foregoing, because by them, these may be easily known.

C H A P. XVIII.

Of the Composite Order.

THE *Composite* Order, which is also called *Roman*, from its having been invented by the antient *Romans*, is so named, because it partakes of two of the foregoing Orders. The most regular and beautiful is that which is compounded of the *Ionick* and *Corinthian*. It is made more slender and disengaged than the latter, and may resemble it in all its Parts, the *Capital* excepted. The *Columns* must be ten *Modules* in length. In the Designs of *Colonnades*, the *Intercolumniation* is one Diameter and a half, which *Vitruvius* calls *Pycnostyle*; and in those of the *Arches*, the *Piers* are half the Void of the *Arch*, and the height of the *Arches*, under the *Keystone* is two Squares and a half.

And as I before observed, this Order must be more slender and disengaged than the *Corinthian*; its *Pedestal*

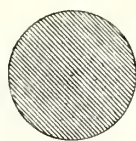
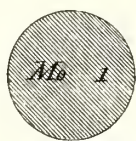
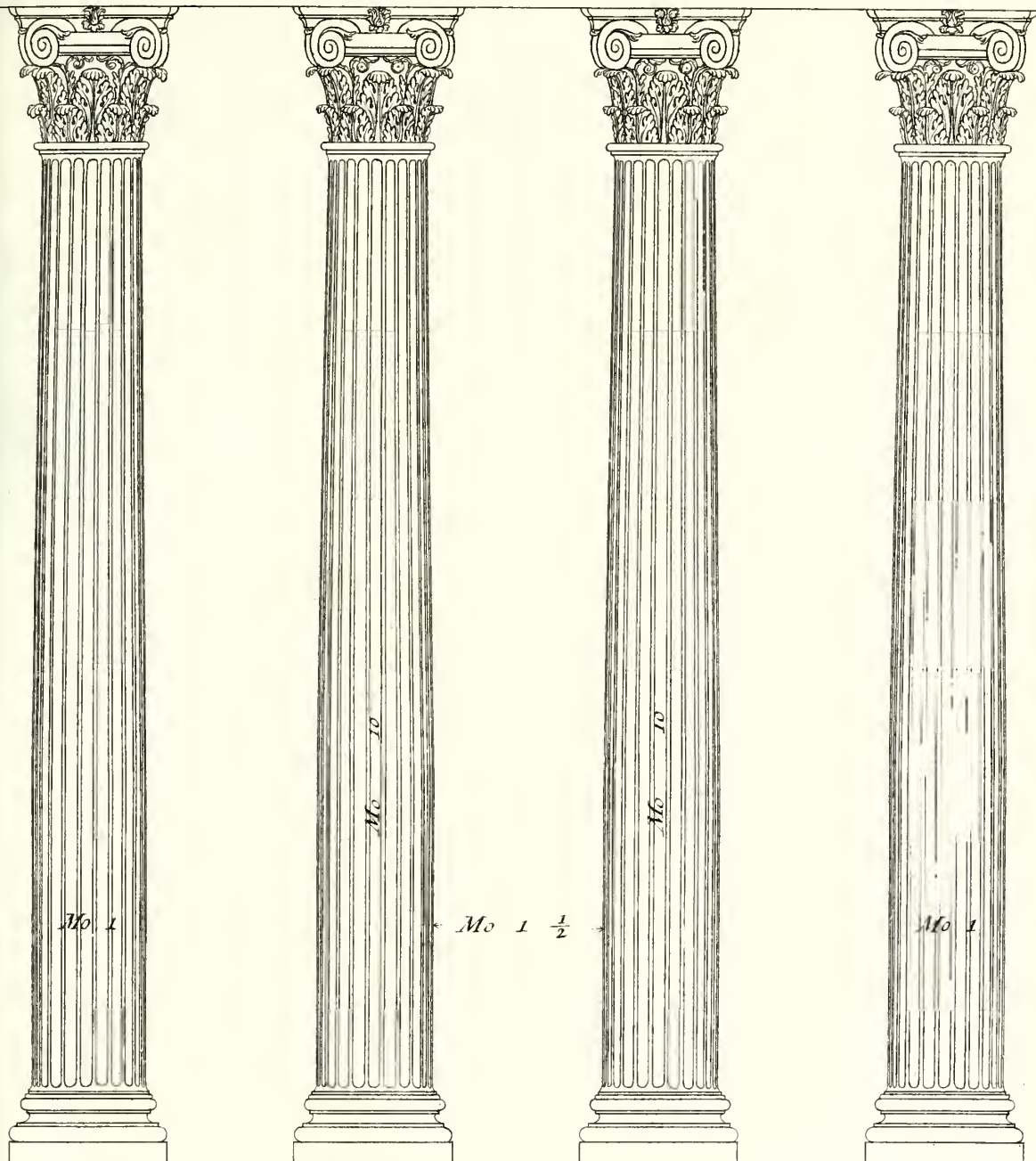
pedestal is one third of the height of the *Column*, and must be divided into eight parts and a half. Of the first the *Cymatium* of that *Base* is made, and five and a half remain for the *Dado*. The *Base* of the *Pedestal* is subdivided into three parts; two are for the *Plinth*, and one for the *Torus* with its *Cymatium*.

The *Base* of this *Column* may be *Attick* as in the *Corinthian*, and also be compounded of the *Attick* and *Ionick*, as appears by the *Design*.

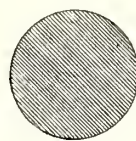
The *Profils* of the *Imposts* of the *Arches*, are by the side of the *Plan* of the *Pedestal*, and its height is equal to the thickness of the *Membretto*.

The *Composite Capital* has the same Measures as the *Corinthian*, but differs from it in the *Volute*, the *Ovolo*, and *Astragal* cut into *Beads*, which Members are borrowed from the *Ionick*, the way of making which is as follows. From the *Abacus* downward, the *Capital* is divided into three parts, as in the *Corinthian*; the first is given to the first Row of *Leaves*, the second to the middle Row, and the third to the *Volute*, which is made in the same manner, and with the same Points, as that of the *Ionick*; and takes up so much of the *Abacus*, that it seems to go out of the *Ovolo*, near the *Flower* which is put in the middle of the *Curvature* of the *Abacus*; and it is as thick in *Front*, as the breadth of the *Horns* thereof, or a little more. The thickness of the *Ovolo* is three fifths of the *Abacus*; its lower part begins parallel to the *Eye* of the *Volute*; its *Projecture* is three fourths of its height, and with its *Projecture* is perpendicular to the *Curvature* of the *Abacus*, or a little more outwards. The *Astragal* is one third part of the height of the *Ovolo*, and its *Projecture* a little more than half its thickness, and turns about the *Capital* under the *Volute*, and is always seen. The *Gradetto* or *Listella* which is under the *Astragal*, and forms the *Plinth*
of

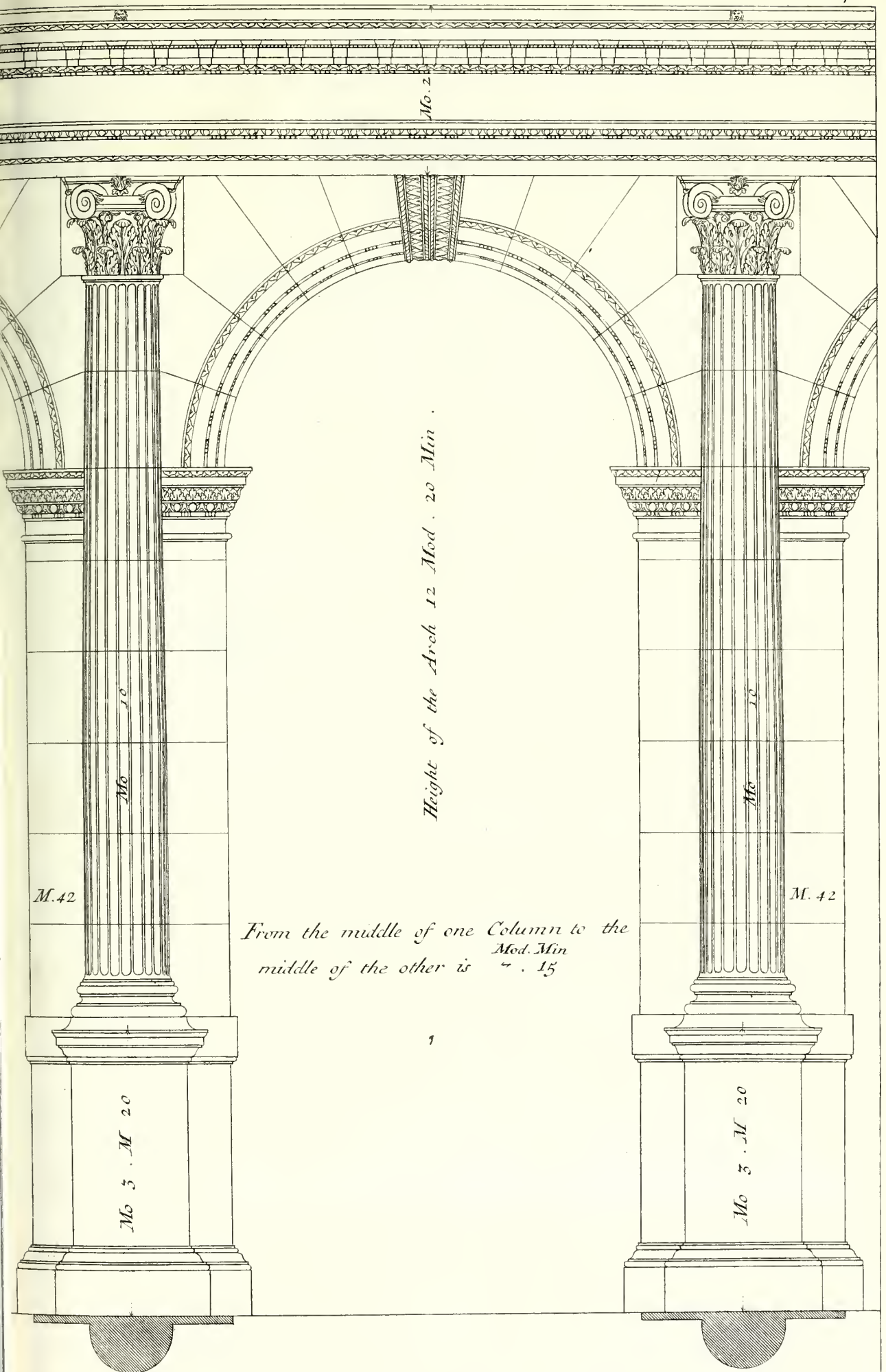
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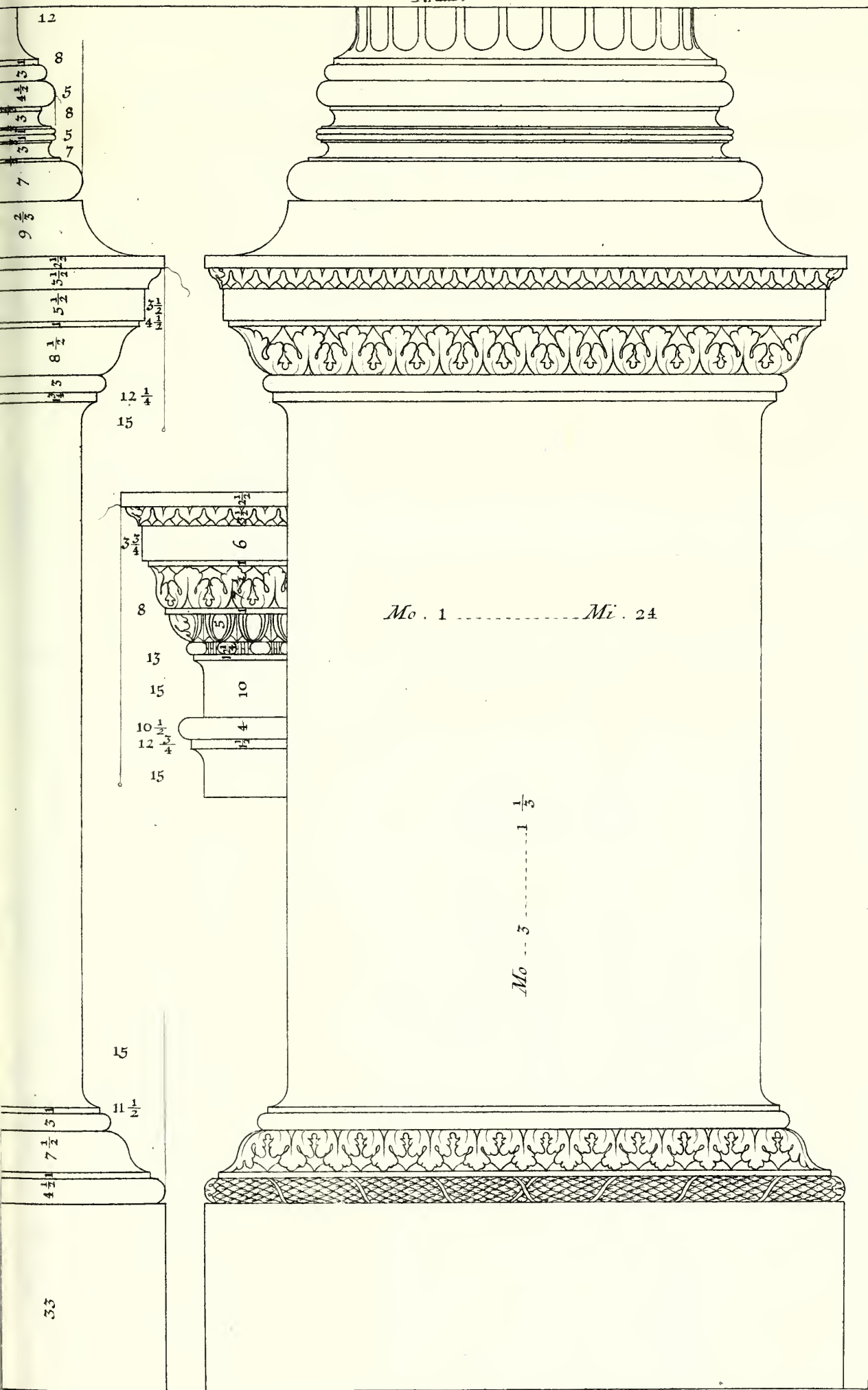
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XVIII.



of the *Campana*, or *Bell* of the *Capital*, is half the *Astragal*. The Body of the *Campana*, must be perpendicular to the Bottom of the *Flutes* of the *Column*. I saw one of this kind in *Rome*, from whence I borrowed the abovementioned Measures, because I thought it extremely beautiful, and performed with great Judgment. We also see *Capitals*, made in a different manner, that may be called *Composite*; but these will be taken Notice of hereafter, and the *Designs* of them inserted in my Books of *Antiquities*. The *Architrave*, *Freeze* and *Cornice* are together a fifth of the height of the *Column*; and by observing what was before mentioned of the other Orders, and the Numbers marked in the *Design*, their Proportions and Divisions may easily be known.

C H A P. XIX.

Of Pedestals.

Hitherto I have taken Notice of whatever appeared to me essential, with respect to plain *Walls* and their Ornaments; and have touched particularly upon the several *Pedestals* that may be given each Order. But as the Antients did not observe to make them bigger or smaller in the different Orders, notwithstanding that this Member gives so much Beauty and Ornament to the whole, when it is made with Judgment, and in a due Proportion to the other Parts; in order that Architects may have a perfect knowledge thereof, and use them upon occasion, they are to understand that the Antients made them sometimes square, that is to say their Height equal to their Breadth, as in the Arch *de Leoni* in *Verona*, and these I have given to the *Dorick* Order, because it requires solidity. They sometimes regulated their Proportions by the Measure of the Openings or Voids, as in the Arch of *Titus* at *Santa Maria Nova* in
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Rome, and that of *Trajan* over the Gate of *Ancona*, where the height of the *Pedestal* is half of the Void of the *Arch*, which kind of *Pedestals* I my self have employed in the *Ionick* Order. They also sometimes took the Measures from the height of the *Column*, as we see in the City of *Suza*, situated at the foot of the Mountains that divide *Italy* from *France*, in an *Arch* erected in Honour of *Augustus Cæsar*; in the *Arch* of *Pola* a City of *Dalmatia*, and in the *Amphitheatre* in *Rome* in the *Ionick* and *Corinthian* Orders, in all which Edifices the *Pedestal* is one fourth of the height of the *Column*, as I observed in the *Corinthian* Order. In *Verona*, in the beautiful *Arch* called *di Castel Vecchio*, the *Pedestal* is one third of the height of the *Column*, as I have made it in the *Composite*. All these various kinds of *Pedestals* are very beautiful, and bear the most just Proportion to the other Parts. By the Word *Poggio*, which *Vitruvius* mentions in his sixth Book, where he speaks of *Theatres*, we are to understand the same as *Pedestal*, which he makes one third part of the Altitude of the *Columns* made to adorn the *Theatre*. But of these *Pedestals* that exceed one third of the *Columns*, there is an Example in the *Arch* of *Constantine* in *Rome*, the *Pedestals* being of two parts and a half the height of the *Column*. The Antients used to make the *Base* in almost all their *Pedestals*, twice the thickness of the *Cymatium*, as will be shewn in my Book of *Arches*.

C H A P. XX.

Of the Errors and Abuses in Architecture.

HAVING thus far laid down the several Ornaments of *Architecture*, i. e. of the five Orders thereof; shewn the manner of making them, and given the *Profils* of their several Members, agreeable

agreeable to the Practice of the Antients; I think it not improper to take Notice in this Place of several *Abuses*, that were first introduced by the Barbarians, and are still practised; in order that the studious in this Art may avoid them in their Works, and be able to know them in those of others. I say therefore that *Architecture*, being as all other Arts an Imitation of Nature, will not for that Reason, admit of any thing either opposite or foreign to that Order and Harmony, which Nature observes in all her Operations; whence the antient Architects, who first began to make their Buildings of *Stone*, that till then had been of *Timber*, gave it for a Rule, that *Columns* should be thicker at the Bottom than at the Top; wherein they borrowed an Example from Trees, which are less at the Top, than at the Trunk and near the Roots. In like manner, as it is natural for those things on which any great Weight is laid, to sink down, under the *Columns* they put *Bases*, which with their *Torus's* and *Cavetto's*, seem to be the Swellings caused by the Burthen they sustain: To the *Cornice's* they likewise added *Triglyphs*, *Modillions*, and *Denteeles*, to represent the Ends of those *Joists*, that support the Cielings and Roofs. If we examine seriously, we shall find that the same was observed in all the other Parts; for which Reason one cannot but disapprove of that Form of Building, which departing from those Rules that Nature herself points out, and that simplicity which appears in all her Productions; form to themselves a new kind of Nature, by deviating from all that is good, true and beautiful in *Architecture*. Wherefore, we must not, instead of *Pilasters* or *Columns* that are to sustain any Burthen, place *Cartouches*, which are certain Scrolls that appear very disagreeable in the Eye of Judges; and so far from administering any Satisfaction or Pleasure to such as are not, gives them only a confused Idea of *Architecture*,

chitecture, and serves only to put the Builder to more Expence. For the same Reason, none of these *Cartouches* ought to come out of the *Cornice*; for it being requisite that all the Parts thereof should be made to some end, and shew as it were what it would be, if the whole Edifice had been framed of *Timber*; and as it is likewise natural, that a great Weight should be sustained by something solid and strong enough to support it; it is certain that these *Cartouches* would be altogether superfluous, since it is impossible that *Joysts*, or any *Timber* whatever, should perform the Effect the *Cartouches* represent; and as they are supposed to be slender and weak, I do not conceive how they can with any shew of Reason, be put under any thing gross and weighty. But that which appears to me the greatest *Abuse* of all, is the making of *Frontispieces* of Gates, Windows and Galleries, divided and open in the Middle, since these *Frontispieces* were first made to defend these parts of the Building from Rain, &c. Necessity having taught the antient Architects to cover them, and to give them the form of a Roof; for which Reason I think nothing can be more ridiculous, than to open that part, which was invented for no other end, than to shelter the Inhabitants of the House, and those who go into it, from Rain, Snow, Hail, and other Inclemencies of the Weather. And though Variety and Novelty should naturally please all Men, yet they are not to be introduced in opposition to the Precepts of Art, and the Dictates of Reason; and indeed we find that the Antients in their several Inventions, never departed from any general and necessary Rules of Art, as I shall shew in my Book of *Antiquities*. As for the Projectures of the *Cornice* and other Ornaments, it is no small *Abuse* to make them very great; because when they exceed a just and reasonable Proportion, particularly if they are in a close Place, they make it still closer, and more disagreeable to the Eye, and frighten those

those who stand under them, who think they are going every moment to fall upon their Heads. Nor ought we to be less careful to make the *Cornices* in a just Proportion to the *Columns*; because if great *Cornices* are placed over little *Columns*, or upon great *Columns*, little *Cornices*, the whole must needs have a very unpleasing Aspect. Moreover, the feigning or supposing of the *Columns* to be composed of several Pieces, and jointed together by certain *Annulets* and *Garlands* round them, that seem to keep them tight together, ought so much the more to be avoided, since the more solid and entire the *Columns* appear to the Eye, the better they perform that for which they were erected, which is to make the whole Edifice stronger and more secure. I might take Notice of several other *Abuses* of the same Nature, as of some Members in the *Cornice* which are made disproportionate to the rest, but these things may be easily discovered by what was before observed, and what I mentioned in this place. It remains next to consider the disposing of the particular and principal Parts of a Building.

C H A P. XXI.

Of Galleries, Entries, Halls, Rooms, and the manner in which they are to be contrived.

Galleries were generally made in the fore or back-front of a Building, and are likewise placed in the middle of it if only one; or in the Wings if there are to be two *Galleries*. These *Galleries* are useful on several Accounts; for walking, eating, &c. and are made either large or small, as conveniency, and the quality and greatness of the Edifice may require; but they should never exceed twenty Foot in breadth, nor be less than ten. Besides every House that is built

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with Judgment, ought to have in the middle, and the principal Parts thereof, certain Places, with which all the other Parts of the House have a Communication. These in the lower Part of the House, are usually called *Entries*, and in the upper, *Halls*; and are as so many publick Places. In these *Entries* Persons attend, till such time as the Master of the House comes out, in order to transact Business with him, or to pay their Compliments to him, and are, after the *Galleries*, the first Places that present themselves to those who enter into the House. *Halls* serve for the celebration of Weddings, Balls, Banquets, Plays and such like Diversions, and for that Reason must be made much more spacious than any of the other Apartments; and be so contrived, that a great Company may be commodiously entertained in them, and see every thing that passes. In the length of *Halls*, I never exceed twice their breadth; but the nearer they are to a square, the more beautiful and commodious they will be.

The *Rooms* must be equally distributed on each side of the *Entry* and the *Hall*, observing that those on the Right Hand, correspond, and be of the same bigness with those on the Left, by which means there will be a just Harmony and Proportion in the several parts of the Building, and the Walls will be equally pressed by the Roof. For if the Apartments are made larger on one side of the Building than on the other; in the former case they will easily resist the Weight, because of the thickness and solidity of the Walls; but in the latter they will be too weak, which will occasion great Inconveniencies, and at last ruin the whole Fabrick. The most beautiful Proportions in the designing of *Rooms* are seven in Number; for either they are made round, (which form is now very seldom used;) or square; or their length is the Diagonal of their Square; or of one Square and a third; or a Square and a half; or a Square and two thirds; or lastly of two Squares.

C H A P. XXII.

Of Floors or Pavements, and Cielings.

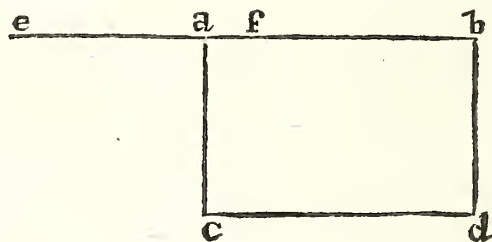
HAVING thus seen the Form and Construction of *Galleries, Halls and Rooms*, we proceed to their *Floors and Cielings*. *Floors* are made either of *Terazzo* or *Mortar*, as at *Venice*, of *Bricks*, or of natural *Stones*. Those of *Mortar* are exceeding good which is made of *Brick-Batts*, fine *Sand*, *Lime* made of *River-Pebbles*, or of *Paduan Stone*, the whole well mixt together. These *Floors* must be made either in the *Spring* or in the *Summer*, in order that they may be very dry. *Brick Pavements* are very beautiful and agreeable to the Eye, as well because of the variety of Colours, which they borrow from the different kinds of Earth of which they are made, as from the different Shapes which may be given them. The *Floors* of *Chambers* are very seldom of natural *Stone*, they making them very cold in *Winter*; but they do very well in *Galleries*, and Apartments for publick Reception. We are to observe that those *Chambers* upon the same Story, must have their *Pavement* level, and in such a manner, that the Thresholds of the Doors may not be higher than the rest of the Plan of the Rooms; and if any little Room or Closet should not come up to that Height, the remainder must be supplied with a *Mezonin* or false *Cieling*. There are likewise several ways of making *Cielings*, for many like to have them of handsome and well-wrought *Joysts*; in which case we must take Care that the distance between the *Joysts*, be once the thickness and a half of the said *Joysts*, for such a distribution will make the *Cieling* very handsome, and so much of the *Wall* will be left between the ends of the *Joysts*, as is sufficient to support the Weight over it; but if they are made at a greater distance

distance they will look ill; and if at a lesser, they will divide as it were the upper *Wall* from the lower; and in case the *Joysts* should rot, or happen to be set on fire, the upper *Wall* must be ruined of course. Others are for having Compartments of *Stucco-work*, or of *Timber*; these they fill with Pictures, so that they may be variously adorned, which is the reason why no fixed and determinate Rules can be given upon this Head.

C H A P. XXIII.

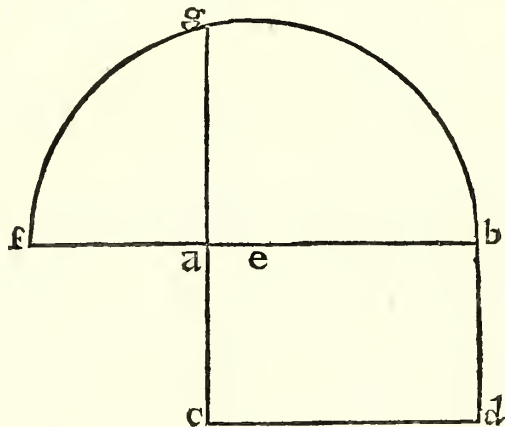
Of the Height of Rooms.

ROOMS are made either with an arched or a flat *Cieling*; if with the latter, the height from the *Floor* to the *Joysts* must be equal to their breadth, and the *Rooms* over them must be a sixth part less in height than those beneath. If the *Rooms* are to be arched, as they generally are in the first Story, (this giving them a graceful Aspect, and making them less subject to Fire,) their height in square *Rooms*, is a third part more than the breadth of the *Room*. But in those whose length exceeds their breadth, a height must be sought proportionable to their length and breadth, which may easily be found, by joining the two Lines of the length and breadth, and dividing the whole into two equal Parts, one of which will be the exact height of the *Arch*; as for Example; let *BC* be the Place to be arched; add the breadth *AC* to the length *AB* and we have the Line *EB*; which being divided into two equal parts in the Point *F*, gives *FB* the height required. Or if the Chamber to be arched be twelve Foot long and six wide;



wide ; add the two Numbers together, and the Sum is Eighteen, which divided by two, gives Nine ; and this is the height of the *Arch* required.

Another height proportionable to the length and breadth of a *Room* is found in this manner. *BC* being the *Room* to be arched ; join the length to the breadth, and it gives the Line *BF* ; this must afterwards be divided into two equal parts at the Point *E*, which making a Center, describe thereon the Semi-Circle *BGF* ; then continuing the Line *AC*, till it touches the Circumference of the Point *G*, *AG* shall be the height of the *Arch BC*. The way to find it in Numbers is as follows. The length and breadth

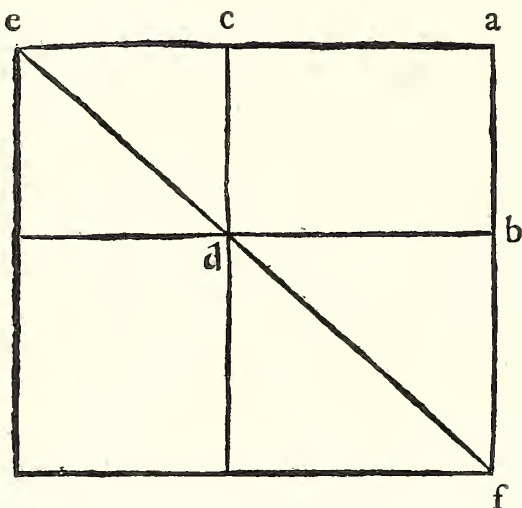


of the *Room* being given, a Number must be found, that bears the same proportion to the breadth, as the length does to it, which is done by multiplying the lesser Extreme by the greater, and the square Root of the Product will be the height. As for Example, Let the Place to be arched be nine Foot long and four Foot broad ; the height of the *Arch* will be six Foot ; and the same proportion that Nine has to Six, Six has to Four ; that is the *Sesquialtera* Proportion. But it is to be observed, that we cannot always find this height by Numbers.

Another height may be likewise taken, which though less, will notwithstanding be proportionate to the *Room*, and is as follows ; having drawn the Lines *AB*, *AC*, *CD* and *BD*, representing the length and breadth of the *Room*, and found the height thereof according to the first Method, which will be *CE*, join it to *AC* ; then draw the Line *EDF*, and prolonging *AB*, till it touches *EDF* in the Point *F* ;

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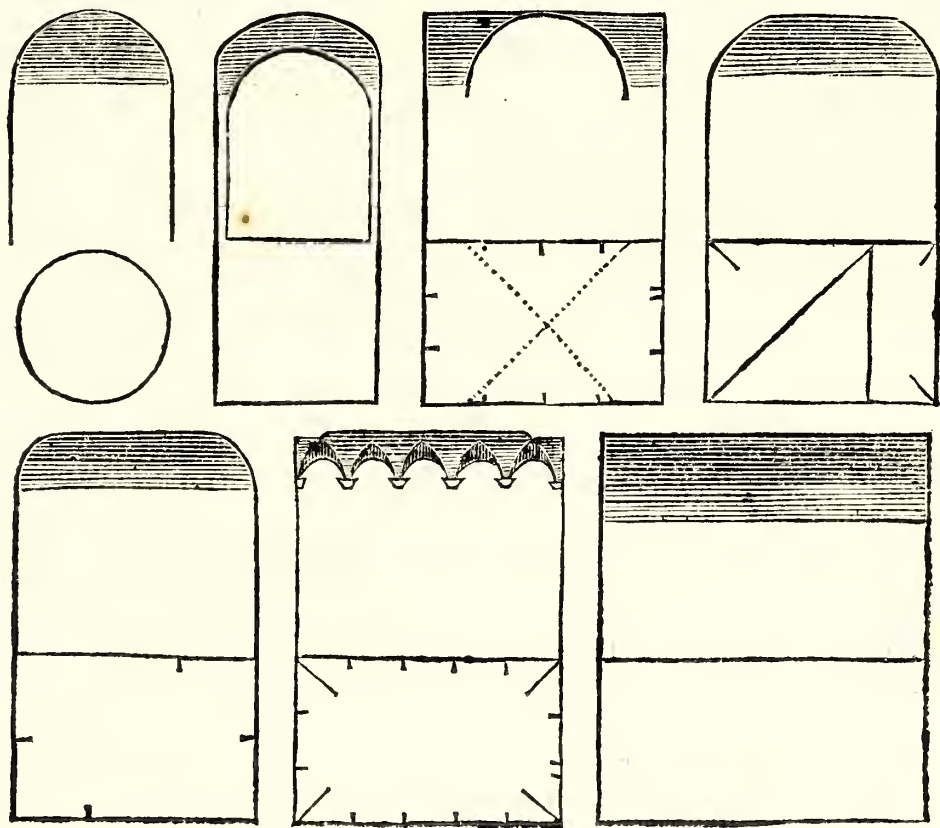
the Line *BF* shall be the height of the *Arch*. But to find it in Numbers the Method is thus. Having by the length and breadth of the *Chamber*, found the height thereof according to the first Method, which in the foregoing Example was Nine; first add together the length, breadth, and height, as

in the Figure; then multiplying the Nine by Twelve, and afterwards by Six; set the Product made by Twelve under Twelve, and the Product made by Six under Six; when this is done, multiply Six by Twelve, and set the Product thereof, which is Seventy Two, under Nine; lastly, having found a Number that multiplied by Nine, produces Seventy Two, which in this Example would be Eight, I say that eight Foot is the height of the *Arch*. These several heights have this relation between themselves, *viz.* that the first exceeds the second, in the same *Ratio* or Proportion that the second exceeds the third. Each of these heights may then be made use of, according to the conveniency they give for contriving; that several *Rooms* of different Dimensions may be so made, as to have all their *Arches* of an equal height, and be at the same time in a just Proportion. By this means the *Chamber* will look handsome, and be very commodious for the *Floor* above, which will be upon a level. There are other Proportions for the height of *Arches*, which do not come under any Rules, and are therefore left to the Judgment of the Architect, to make use of them as Necessity shall require.

C H A P. XXIV.

Of the several kinds of Arches.

TH E R E are fix forts of *Arches*, viz. *Crossed*, *Fasciated*, *Flat*, (for so those *Arches* which are but the Segment of a Circle, and are less than a Semi-Circle, are called) *Circular*, *Grinded* and *Shell-like*, all which are in height one third of the breadth of the *Room*. The four first were used by the Antients, but the two last are of modern Invention. *Round Arches* are made in square *Chambers*, and the manner of raising them is as follows. In the Angles of the *Room* we leave certain *Mutules*, or *Modillions*, that support the Semi-Circle of the *Arch*, which in the middle is flat, but more circular the nearer it comes to the Angles. We have an Example of one of this kind in the Baths of *Titus* in *Rome*, part of which when I saw it, was moulder'd away. I have here given the *Designs* of all these different Methods of arching, adapted to the various Figures of the *Rooms*.



C H A P. XXV.

Of the Measures, or Proportions, of Gates, Doors, and Windows.

IT is impossible to give any fixed and determinate Rules, for the height and breadth of the *Gates* of large *Fabricks*, nor for the *Doors* and *Windows* of *Rooms*; and that, because that in making *Gates*, the Architect is obliged to suit them to the Greatness of the Edifice; to the Quality of the Master, and the Conveniency of whatever is to go in or out of the same. The Method I best approve of is as follows; divide the Space from the Ground to the Superficies of the *Joysts* into three parts and a half, as *Vitruvius* teaches *Book 4. Chap. 6*, two of which give to the height of the Void or Opening, and one to the breadth, less the twelfth of the height. The Antients used to make their *Gates* narrower at Top than at Bottom, as we see in the Temple at *Tivoli*; and *Vitruvius* has given the same Rule, probably because it would give a greater solidity. The *Gates* and principal *Doors* must be placed in such a manner, that an easy access may be had to them from all parts of the House. The *Doors* of *Rooms* must not be more than three Foot wide, and six and a half high; nor less than two Foot wide and five Foot high. In making the Openings for *Windows*, we must observe to make them in such a Proportion, as not to let too much, nor too little Light into the *Room*; and likewise not to make the *Windows* themselves too close, nor too far distant one from the other. In this case therefore a particular Regard is to be had to the Dimensions of the *Chamber*, since it is natural, that a large *Room* should receive much more Light than a small one; and if the *Windows* are made either less in Number,

or

or smaller than is requisite, the Apartments will be dark ; as on the contrary, if they are too large, or too many in Number, they will scarce be habitable, because of the great Quantity of Air they will let in, which will make them either very hot or very cold, in the different Seasons of the Year, unless they face such a side of the Heavens, as is soft and temperate. For these Reasons the breadth of the *Windows* must not exceed a fourth part of that of the *Room*, nor be less than a fifth part ; they must have in height two Squares, and a sixth part of their breadth. And as in a House, although it be composed of several *Rooms*, (some of which are large, some small, and others between both,) we yet are obliged to make the several *Windows* in the same Story equal ; in the measure of the said *Windows*, I regulate my self by the Dimensions of those *Rooms*, whose length is two thirds more than their breadth, that is, if the breadth be eighteen Foot, the length must be thirty, and I divide the breadth into four parts and a half, one of which I allow to the Opening of the *Window*, and two to the height, with a sixth part of the breadth, observing the same Proportion in all those of other *Rooms*. The *Windows* of the second Story, must be a sixth part less, than the length of the Opening of those of the first, and if there are more Stories, they must diminish in the same Proportion. The *Windows* on the Right Hand must answer to those on the Left, and those above be exactly perpendicular over those below ; and in like manner the *Doors* must be directly over one another, in order that the void may be over the void, and the solid over the solid ; and lastly, they must all be upon the same level, by which means one may see at once from one end of the House to the other, which is very beautiful, and likewise cool in *Summer*, not to mention several other Conveniencies. It is usual for Strength, and in order that the *Lintels* or *Architraves* of the *Doors* and *Windows* may not be pressed by too great a Weight,

to raise certain *Arches*, generally called *Flat Arches*, that contribute very much to the duration of the Fabrick. The *Windows*, as has been already observed, must be as far distant from the Angles, or Corners of the Building as possible; for as that part was made to fasten and bind together all the rest of the Fabrick, it must not for that Reason be open and weak. The *Pilasters*, or *Jambs* of the *Doors* and *Windows*, are not to be thicker than a fifth Part of the breadth of the Opening, nor less than a sixth. It remains in the next Place to speak of their Ornaments.

C H A P. XXVI.

Of the Ornaments of Doors and Windows.

THE Manner how to beautify and adorn the *Gates* of Buildings may be easily known, from the Instructions *Vitruvius* has given in the sixth Chapter of his fourth Book; from the Explanations and Designs which the most Reverend *Barbaro* has given to illustrate that Chapter; and from what I my self have already observed and *designed* upon all the five Orders; but waving these Matters, I shall only present my Reader with some *Profils* of the Ornaments of the *Doors* and *Windows* of *Chambers*, according as they may be varied; and will shew how to *Design* each *Member* with Grace, and to give it its due *Proportion*. The Ornaments of *Doors* and *Windows* are the *Architrave*, the *Freeze* and *Cornice*. The *Architrave* turns about the *Door*, and must be as thick as the *Jambs* or *Pilasters*, which as I said before must not be less than a sixth Part of the breadth of the Opening, nor more than a fifth; and the thickness of the *Freeze* and *Cornice* are taken from the same Opening. Of the two following Inventions, the first, *i. e.* the uppermost, has these Measures. The *Architrave* is divided into four Parts, three of which are for the height

height of the *Freeze*, and five for that of the *Cornice*. The *Architrave* is again divided into ten Parts; three whereof go to the first *Fascia*, four to the second, and the remaining three are subdivided into five Parts; of these two are for the *Regolo* or *Orlo*, and the remaining three for the *Cima Reversa*, which is also called *Cimatium*; its *Projecture* is equal to its height. The *Fillet* projects less than half its Thickness. To design the *Cimatium* is as follows; a right Line must be drawn from underneath the *Fillet*, to the upper Part of the second *Fascia*; this Line must be divided into two equal Parts, each of which is made the *Base* of an *Isoceles Triangle*, or that has two Sides equal; then placing the fixed Foot of the *Compass*, in the *Angle* opposite to the *Base*, draw the *Curve Lines*, and they give the *Cimatium* abovementioned.

The *Freeze* is three fourths of the *Architrave*, and is formed by the Segment of a Circle less than a *Semi-Circle*, and with its Convexity or Swelling is perpendicular to the *Cymatium* of the *Architrave*. The five Parts that are given to the *Cornice*, are distributed to its Members in manner following; one is allowed to the *Cavetto* with its *Listella*, which is the fifth Part of the *Cavetto*, whose *Projecture* is two thirds of its height; and to design it an *Isoceles Triangle* is drawn, whose *Angle C* is the *Center*; so that the *Cavetto* will be the *Base* of the *Triangle*. Another of the said five Parts is given to the *Ovolo*, whose *Projecture* is two thirds of its height, and is formed by drawing an *Isoceles Triangle*, the Point *H* being its *Center*. The other three are subdivided into seventeen Parts; eight of which are for the *Corona* with its *Listellas*, of which that above takes one of the said eight Parts, and that which is below and makes the Hollow of the *Corona*, has but a sixth Part of the *Ovolo*. The other nine are for the *Cima Recta* and its *Fillet*, which is one third of the said *Cima*. To form it with beauty and justness, the right Line *AB* is drawn, which is
divided

divided into two equal Parts in the Point *C*; one of these two Parts is subdivided into seven Parts, six of which being taken in the Point *D*, we afterwards describe the two *Triangles AEC* and *CBF*, then setting the fixed Foot of the *Compass* in the Points *E* and *F*, we describe the *Segments of Circles AC* and *CB*, and they form the said *Cima Recta*.

The *Architrave* of the second Invention, is in like Manner divided into four Parts, three of which are for the height of the *Freeze* and five for that of the *Cornice*. The *Architrave* is again divided into three Parts, two of which being subdivided into seven, three thereof go to the first *Fascia* and four to the second: The third Part is subdivided into nine Parts; two are for the *Astragal*, and the other seven being again subdivided into five; three are allowed to the *Cymatium* or *Ogee*, and two to the *Fillet*. The height of the *Cornice* is divided into five Parts and three fourths, one of which being subdivided into six; five of them are given to the *Bedmoulding* over the *Freeze*, and the other to the *Listella*. The *Projecture* of the *Bedmoulding* is equal to its height, as is that of the *Listella*. One is allowed to the *Ovolo*, whose *Projecture* is three fourths of its height. The *Gradetto* or *Fillet* over the *Ovolo* is the sixth Part of the *Ovolo*, and projects just as much. The other three Parts are subdivided into seventeen; eight are for the *Corona*, whose *Projecture* is one third more than its height, the other nine being subdivided into four; three are given to the *Cymatium*, and one to the *Fillet*: The three remaining are subdivided into five Parts and a half; of one whereof the *Gradetto* or *Fillet* is made, and of the remaining four and a half the *Cymatium* over the *Corona*. The *Projecture* of this *Cornice* is equal to its height.

Members of the Cornice of the first Invention.

I. Cavetto.

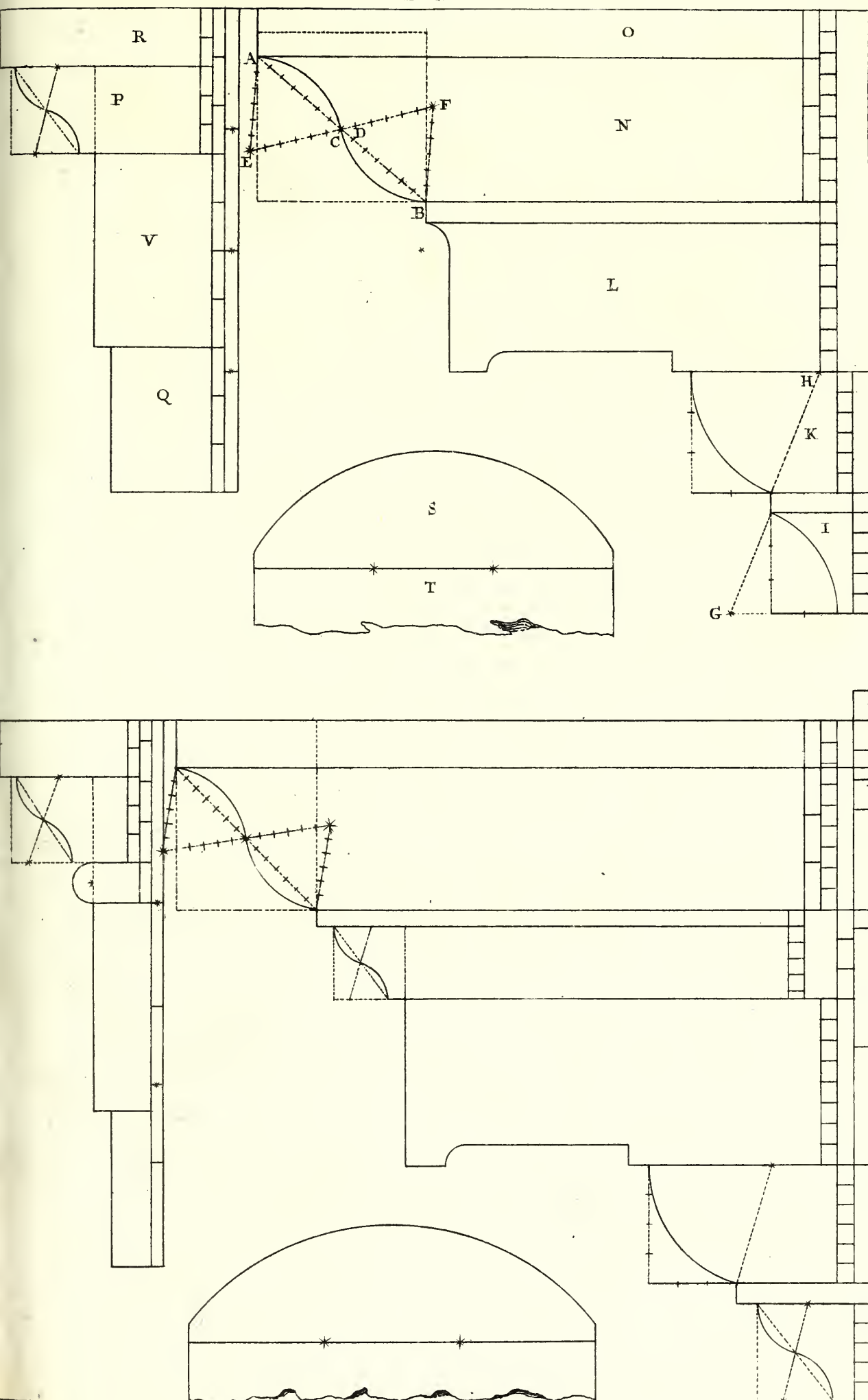
K. Ovolo.

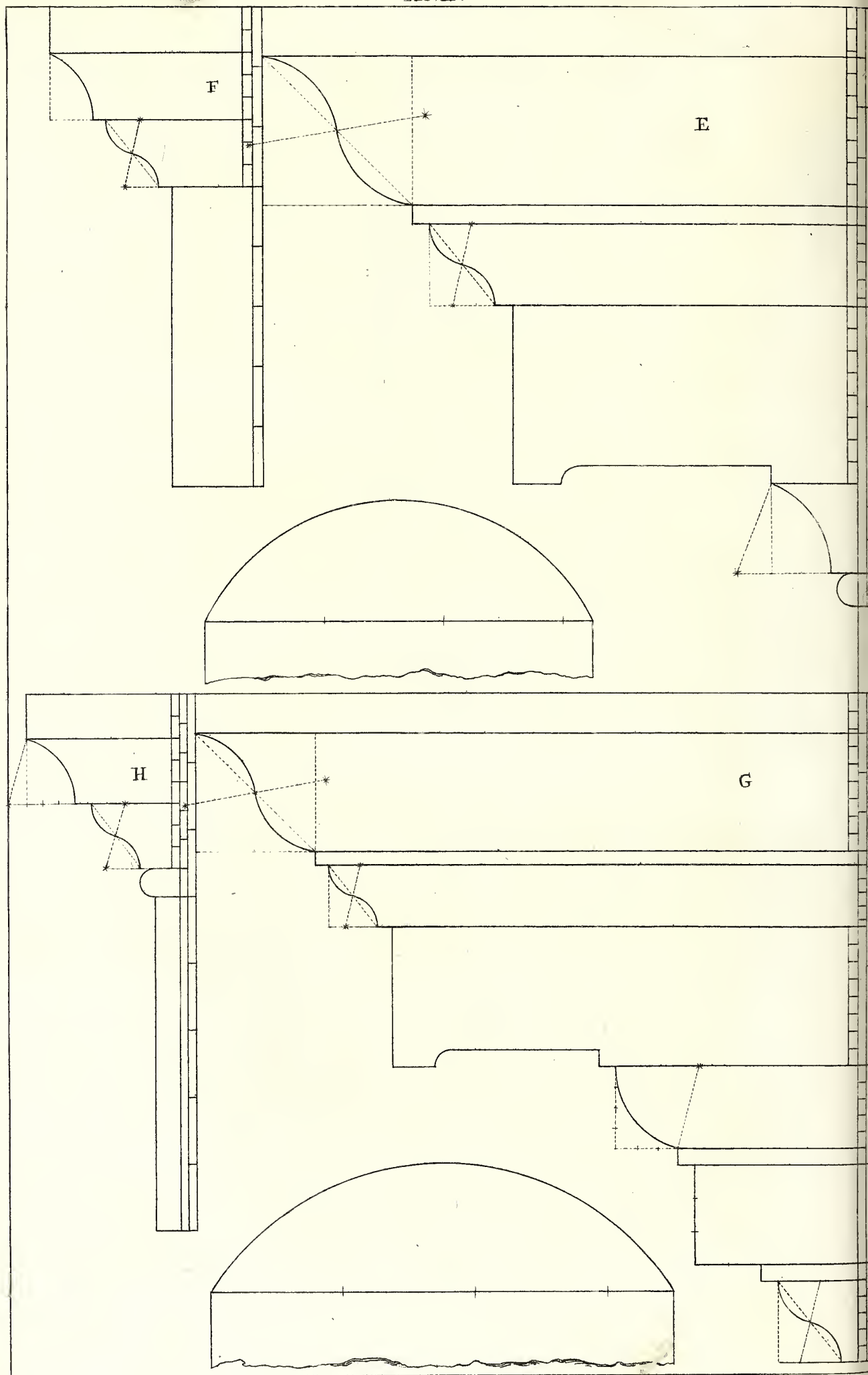
L. Corona.

N. Cymatium.

O. Fillet.

Members





Members of the Architrave.

- | | |
|---------------------------------|---|
| P. <i>Ogee or Cima Reversa.</i> | S. <i>Convexity or Swelling of the Freeze.</i> |
| Q. <i>First Fascia.</i> | T. <i>Part of the Freeze that goes into the Wall.</i> |
| V. <i>Second Fascia.</i> | |
| R. <i>Orlo or Fillet.</i> | |

By the Members here set down, those of the second Invention may be easily known.

In the two following Inventions, the *Architrave* of the first marked *F*, is in like manner divided into four Parts, whereof three and a fourth go to the height of the *Freeze*, and five to that of the *Cornice*. The *Architrave* is again divided into eight Parts, of which five are for the *Fascia*, and three for the *Cymatium*, which is again subdivided into eight Parts; three of which go to the *Ogee*, three to the *Cavetto*, and two to the *Fillet*. The height of the *Cornice* is divided into six Parts; two of which go to the *Cyma Recta* and its *Fillet*, and one to the *Ogee*. This *Cima* is again subdivided into nine Parts, eight of which are for the *Corona* and its *Gradetti* or *Listellas*. The *Astragal* over the *Freeze* has but a third of one of the said six Parts, and that which is left between the *Corona*, and the *Astragal*, is given to the *Cavetto*.

In the other Invention, the *Architrave* marked *H*, is divided into four Parts, three and a half of which are for the height of the *Freeze*, and five for that of the *Cornice*. The *Architrave* is divided into eight Parts, five whereof go to the *Fascia*, and three to the *Cymatium*. The *Cymatium* is divided into seven Parts; one of which is for the *Astragal*, and the rest are again subdivided into eight Parts; of which three go to the *Cima Reversa*, three to the *Cavetto*, and two to the *Fillet*. The height of the *Cornice* is divided into six parts and three fourths; three are given to the *Ogee*, the *Dentile*, and the *Ovolo*. The *Ogee* projects just as much as its thickness; the

Q

Dentile

Dentile have two thirds of its height, and the *Ovolo* three fourths; of the three fourths, the *Ogee* between the *Cymatium* and the *Corona* is made, and the other three parts are subdivided into seventeen; nine are for the *Cymatium* and the *Fillet*, and eight for the *Corona*. The *Projection* of this *Cornice*, as those abovementioned, is equal to its thickness.

C H A P. XXVII.

Of Chimnies.

THE Antients used to heat their Apartments in the following Manner. They built the *Chimnies* in the middle, with *Columns* or *Consoles* to support the *Architraves*, over which the *Piramidal Funnel* was fixed, and through this the *Smoak* was conveyed. One of these kind of *Chimnies* was to be seen at *Baia*, near *Nero's Piscina* or *Fish-Pond*, and another not very far from *Civita Vecchia*. But if there were to be no *Chimnies*, they then made in the thickness of the *Wall* certain *Tubes* or *Pipes*, through which the heat of the Fires made under those *Chambers* ascended, and issued out through certain *Vents* or *Mouths*, at the Top of the said *Tubes* or *Funnels*. The *Trenti*, (a *Vicentine* Family) used to cool the *Rooms* of their *Villa* at *Costoza* during the *Summer*, much after the same Manner. For there are in the Hills on which that *Villa* stands, several deep *Caverns*, called by the Inhabitants of the Place *Covali*, that were formerly *Quarries*. These I believe *Vitruvius* means in his second Book, where treating of *Stones*, he says that in *Marca Trevigiana* a kind of *Stone* is dug that may be sawed like *Timber*. In these *Caverns* certain very cool Winds are generated, which these Gentlemen convey to their Houses through certain subterraneous Passages, called by them *Ventidotti* or *Wind-Pipes*; and by means of *Funnels* like to those abovementioned, they

they afterwards let these refreshing Winds into every *Room* of the House; opening and shutting those Passages at Pleasure, to take more or less Air, according to the Seasons. And although this singular Convenience renders this Place very remarkable, yet that which makes it still more so, and worthy of being seen, is another Place called *il Carcere de Venti*, or the *Prison of Winds*, which is a *Chamber* under Ground, contrived by the most worthy *Sig. Francesco Trento* and by him called *E O L I A*, (as it were the Palace of the God *Æolus*) where many of these *Ventidotti* or *Wind-Pipes* discharge themselves; and to beautify it, and make it worthy of the Name, he has spared neither Care or Expence. But to return to the *Chimnies*, the Moderns make them in the thickness of the *Walls*, and raise their *Funnels* above the *Roof*, in order that they may carry off the *Smoak* quite away into the Air. But Care must be taken not to make the *Tubes* either too wide or too narrow, for in the former Case, the Wind by having too much Room to play in, will by that means drive the *Smoak* downward, and not suffer it to ascend, or go out free and undisturbed; and if they are made too narrow, the *Smoak*, for want of a free Passage, being stifled, will revert or fly back again: For which Reason in the *Chimnies* of *Rooms*, the *Funnels* must not be narrower than half a Foot, nor wider than nine Inches, nor above two Foot and a half in length. The Mouth of the *Pyramid* where it joins to the *Funnel* must be made a little narrower, in order that the *Smoak* driving downward, it may keep it from going into the *Room*. Some make the *Funnels* crooked, in order, by their sinuosity or winding, and the strength of the Fire that forces it upward, to prevent the *Smoak* from reverting or flying back into the *Room*. The *Funnels*, or Openings at Top, through which the *Smoak* is to be conveyed, ought to be wide, and set far from any combustible Substance. The *Mantle-Tree* over which the *Pyramid* of the *Chimney* is placed, must be very neatly wrought, and not the least *Rustick*;

Rustick; this being proper only for very great *Edifices*, for the Reasons already mentioned.

C H A P. XXVIII.

Of Stair-Cases, and the several Methods of building them, and of the Number and Dimensions of the Steps or Stairs.

IN placing of *Stair-Cases* the utmost Care ought to be taken, it being not a little difficult to find a Place convenient for them, that will not at the same time prejudice the rest of the Building. We must therefore assign them a proper Situation, to the end that they may not interfere with the other Parts of the House, nor receive the least Inconveniency from them. *Stair-Cases* must have three *Openings*, the first whereof is the *Door* by which we go up to them, which the less it is hid from those who enter into the House, the more graceful it will appear; and I very much approve the placing of it in such a Manner, as before our coming at it, may give us a sight of the best Part of the House; for then the Building, though little in it self, will appear very large; wherefore it must be obvious, and easy to be found. The second *Opening* is the *Windows*, necessary to light the *Stair-Case*; these must be situated in the middle and be made high, whereby they will diffuse the Light equally. The third *Opening* is the *Landing-Place*, through which we enter into the *Apartments* of the first *Story*; and must lead into handsome, spacious, and well furnished Parts of the House. *Stair-Cases* to be complete, must be *light*, *large*, and *easy* to ascend; which will invite as it were People to go up them: To make them *light some*, they must receive a strong Light, which, as was before observed, must be equally diffused upon all Parts of them. They will be *spacious* enough, provided they be not made too narrow in Proportion to the
the

the largeness and quality of the *Fabrick*; but they must never be narrower than four Foot, to the end that when two Persons meet upon them, there may be Room enough for them to pass. They will be *convenient* with respect to the whole Building, if *Arches* large enough to hold Goods, &c. are made under the *Steps*; and if they are made wide, and of an easy Ascent, it will be more convenient to those who go up and down; for which Reason their tread must be double their height. The *Steps* are not to be more than six Inches steep; and if they should be made something less, particularly if the *Stair-Cases* are long, and have no *Landing-Places*, it will render them still more commodious, because they will tire less, by not obliging one to lift the Foot so high; but then they must not be less than four Inches steep. The breadth of the *Steps* must not exceed one Foot and a half, nor be less than a Foot. The *Antients* in the *Steps* of their *Stair-Cases*, always made their Number *odd*; in order that having begun to ascend with the Right Foot, they might end with the same, which they looked upon as a good Omen, and a mark of more religious Respect, when they entered into their *Temples*. However, eleven or thirteen *Steps* at most will be sufficient to a flight; and if when we are got so far, we must still go higher, then a *Landing-Place* must be made, as well for the ease of such Persons who may be either weary or tired; as in case any thing should happen to fall from above, thereby to stop it, and prevent its rolling any lower. *Stair-Cases* are either made *strait* or *winding*. The former may be divided into two Branches, or *Passages*; or else *square* which turn in four Branches. To make these, the whole Space must be divided into four Parts; whereof two must be given to the *Steps*, and the other two to the *Void* in the middle, whence the *Stair-Case* would receive the Light, in case it were left open. They may be made with the *Wall* inward, and then the *Wall* it self is inclosed in the two Parts which are given to the

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Steps,

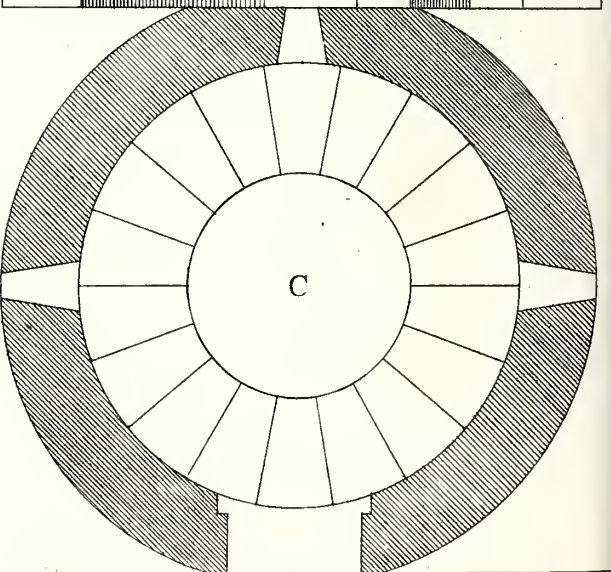
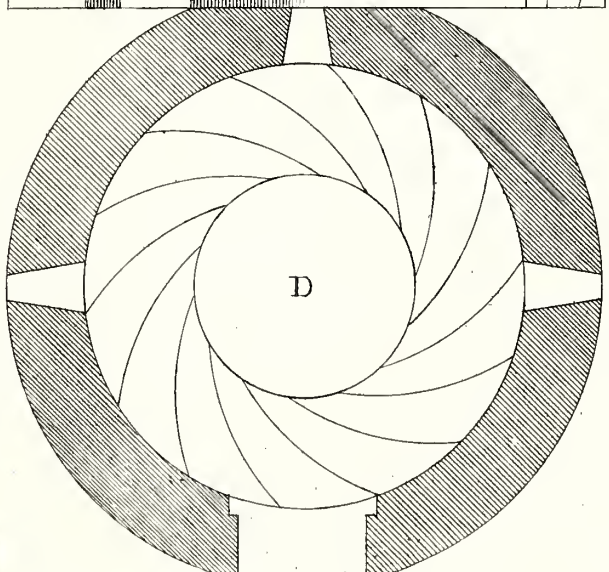
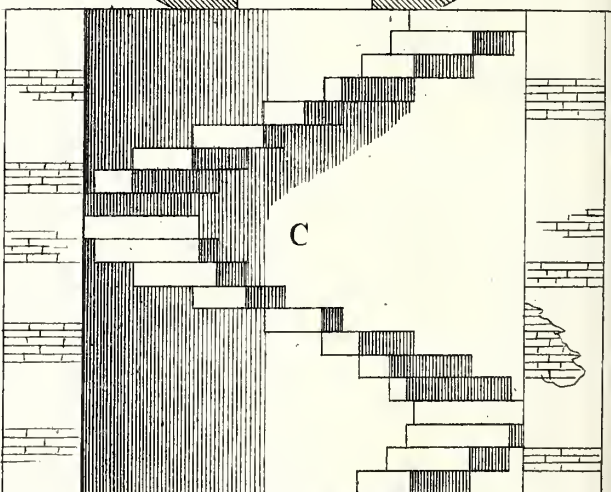
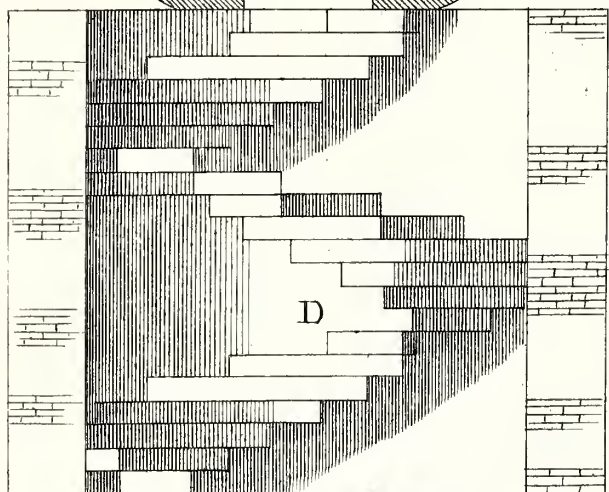
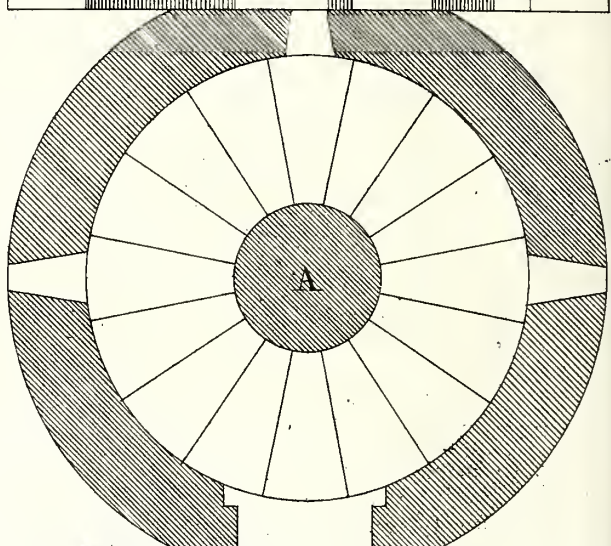
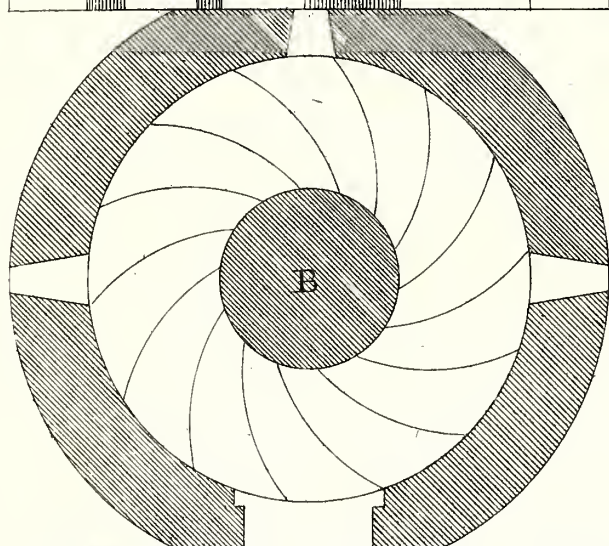
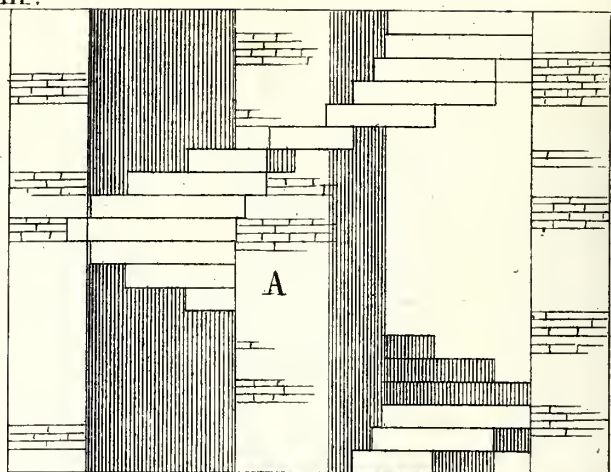
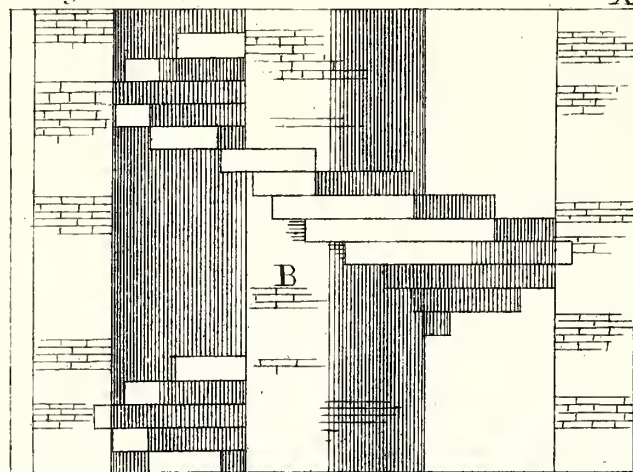
Steps, but there is no necessity of doing this. These two kinds of *Stair-Cases* were invented by *S. Lewis Cornaro*, a Nobleman of a superior Genius, as one may judge by the *Designs* he drew of a very beautiful *Gallery*, and of a magnificent *Palace* which he built at *Padua* for himself to reside in. *Winding-Stairs*, which are also called *Cockle-Stairs*, are sometimes made *Circular*, and sometimes *Elliptical*; at other Times with a *Column*, or *Newel* in the middle; or open, especially if there be little Room, because they take up less Space than the *strait*; but they are not quite so easy to ascend. Those which are open in the middle are found to be handsome, not only from their receiving the Light from above, but because that whoever is at the Top of the *Stair-Case*, may see, and be seen by all those who go up and down them.

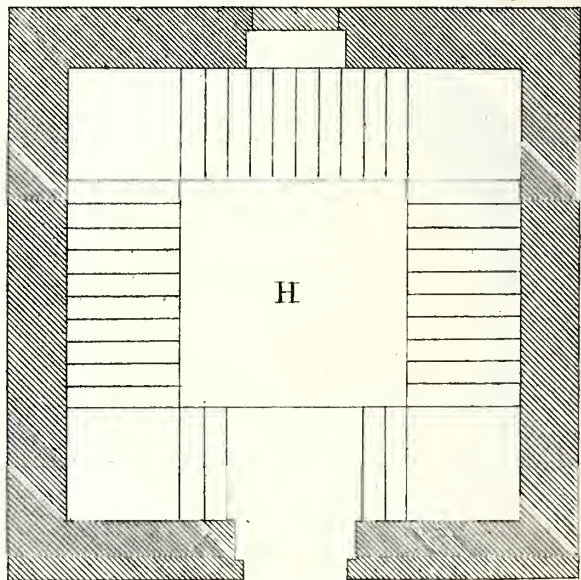
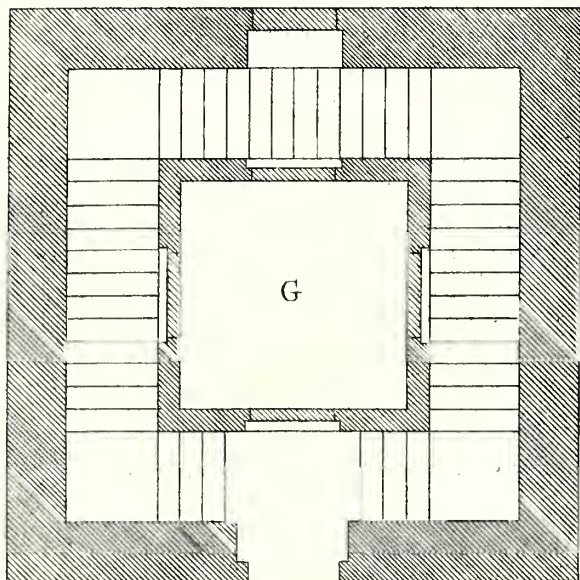
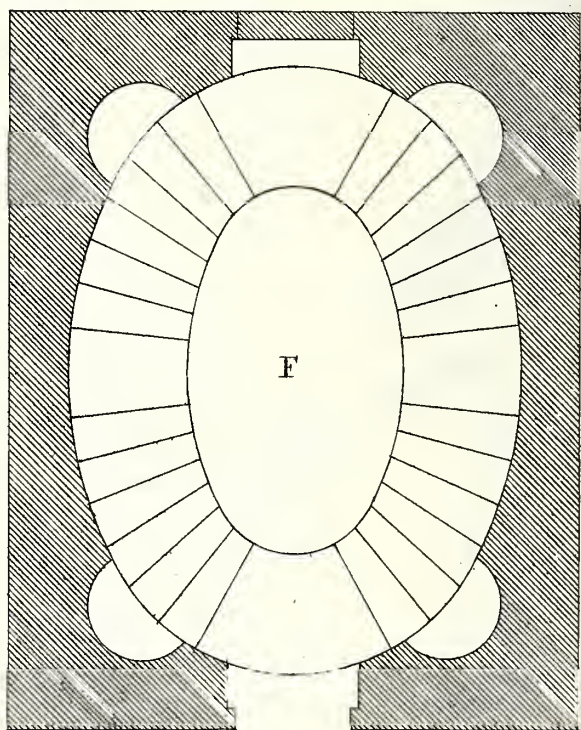
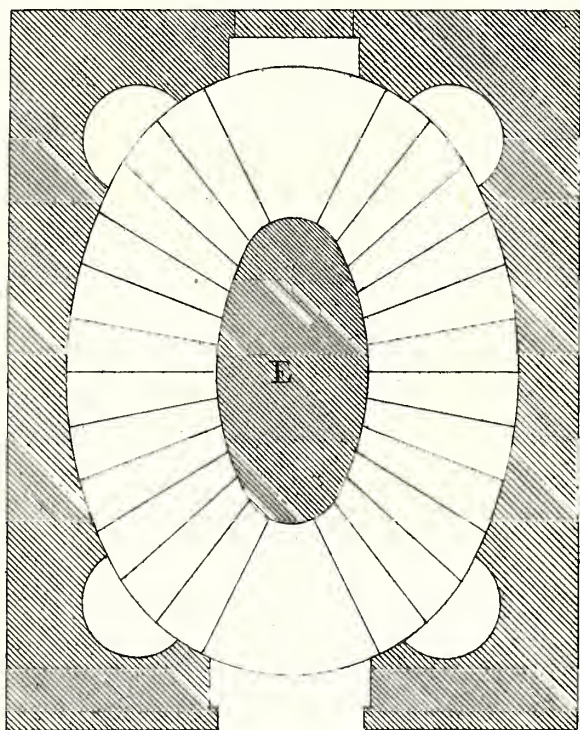
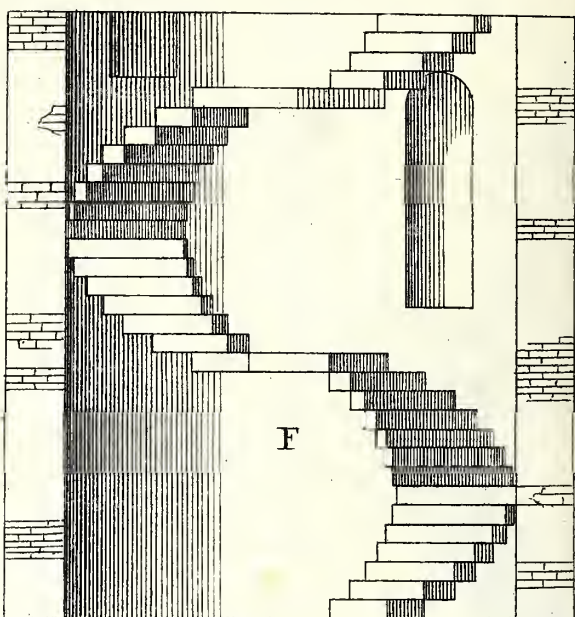
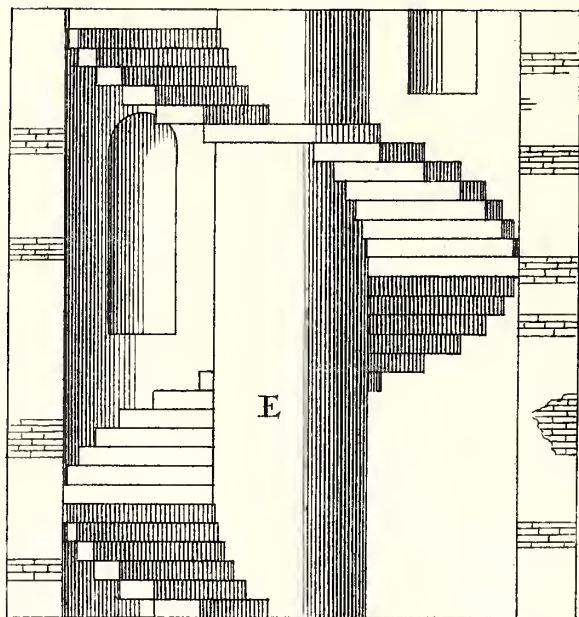
Those which wind round a *Newel* are made in the following manner: The *Diameter* being divided into three Parts, two are given to the *Steps* and one to the *Newel*, as in the *Design* marked *A*; or the *Diameter* shall be divided into seven Parts, whereof three must be given to the *Newel* in the middle, and the remaining four to the *Steps*, which has been exactly observed in the *Stair-Case* of the *Pillar of Trajan*: And if the *Stair-Cases* are made *Circular* as in the *Design B*, they will look extremely beautiful, and be of a greater length than if they had been made *strait*. But in open *Stair-Cases*, the *Diameter* is divided into four Parts, two whereof are for the *Steps*, and two for the Space in the middle.

Besides the several kinds of *Stair-Cases* commonly made, the ingenious *Mark Anthony Barbaro*, a *Venetian* Gentleman, hath invented another sort of *Winding Stair-Case*, which is wonderfully well suited to narrow Places. This has no *Newel* in the middle, and as the *Stairs* are *Circular*, they become by that means very long.

It is divided in the same manner as that before mentioned.

Elliptical





Elliptical Stair-Cases are divided in the same Manner as the *Circular*, and are very beautiful and graceful, because all the *Windows* and *Doors* are at the head, and in the middle of the *Elipsis*, and these are very commodious. I my self have made one of this sort, which is open in the middle, in the Monastery *della Carità*, or of *Charity*, in *Venice*, with very good Success.

- A. *Winding Stair-Case, with a Newel in the Middle.*
- B. _____ *with a Newel and Circular Steps.*
- C. _____ *open in the Middle.*
- D. _____ *open in the Middle, and with Circular Steps.*
- E. *Elliptical Stair-Case, with a Newel in the Middle.*
- F. _____ *without a Newel.*
- G. *Strait Stair-Case, with the Wall on the inside.*
- H. _____ *without a Wall.*

Another beautiful kind of *Winding Stair-Case*, was made by order of the magnanimous Monarch, *Francis the First*, King of *France*, at *Chambor*, in a Palace built in a Wood, which *Stair-Case* is as follows. There are four *Stair-Cases*, with four Entrances to them, *viz.* one to each, which go up the one over the other in such a manner, that being made in the middle of the Building, they may serve for four Apartments; so that the Inhabitants of one *Stair-Case*, need not go down those of the other; and being open in the middle, they all see one another go up and down *Stairs*, without incommoding one another. As this Invention is new and beautiful, I have inserted a *Design* thereof, and marked the several *Stair-Cases* with Letters in the *Plan* and *Profil*, purposely to shew where each of them begins, and how they go up.

There are also in the *Portico's* of *Pompey* at *Rome*, in the Way that leads to the *Jews Quarter*, three
Winding

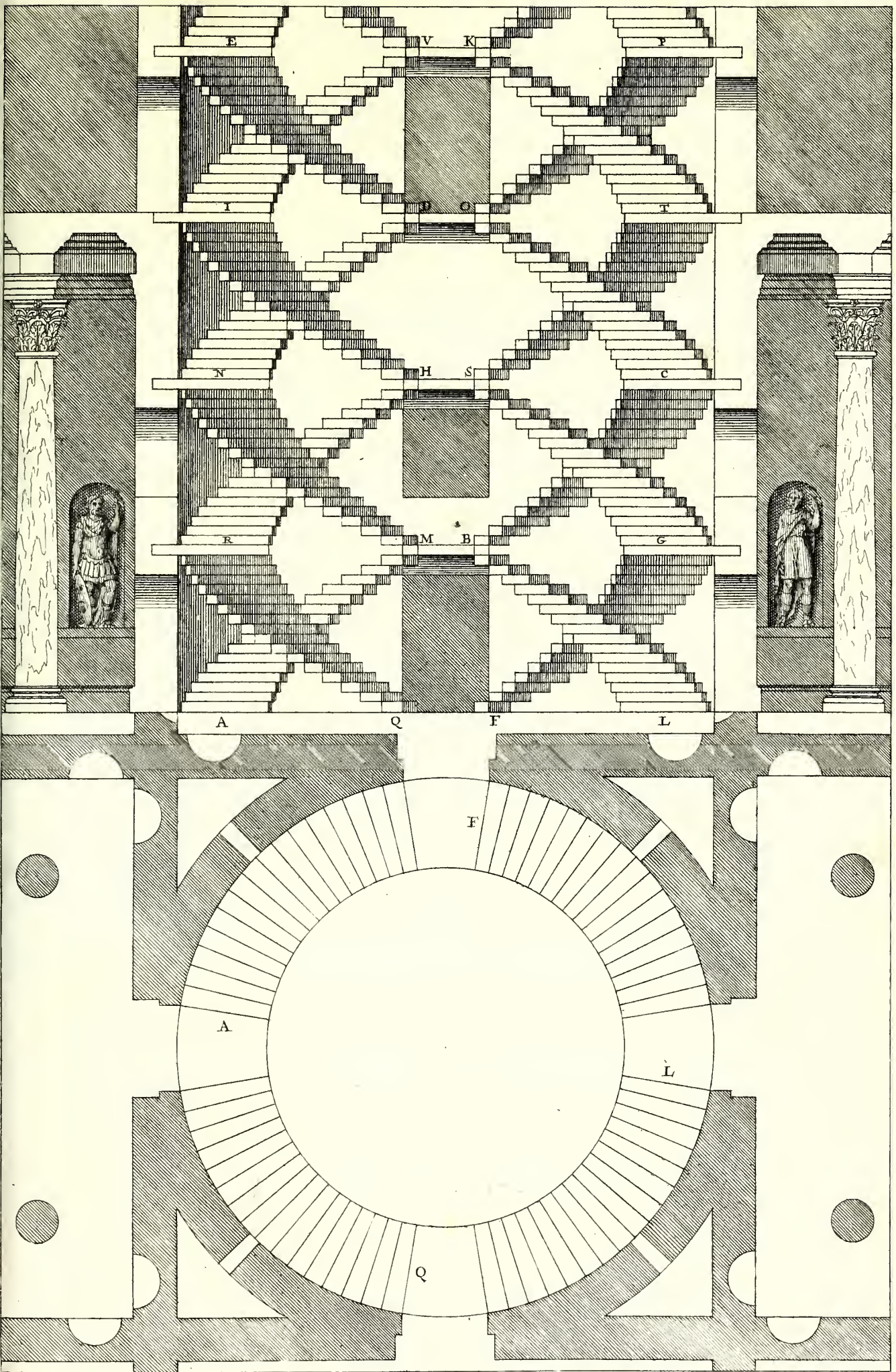
Winding Stair-Cases of a very beautiful Invention; for being placed in the middle of the *Edifice*, whence it would have been impossible for them to receive any Light but from above, they were set upon *Columns*; to the end that the Light might be diffused equally on all Parts. In imitation of which *Bramante*, a most excellent Architect in his Time, made one in the *Belvidera*, but without *Steps*, and composed it of the four following *Orders*, viz. the *Dorick*, *Ionick*, *Corinthian* and *Composite*. This kind of *Stair-Case* is made by dividing the whole Space into four Parts; two whereof are for the void in the middle, and one for each side of the *Steps* and *Columns*.

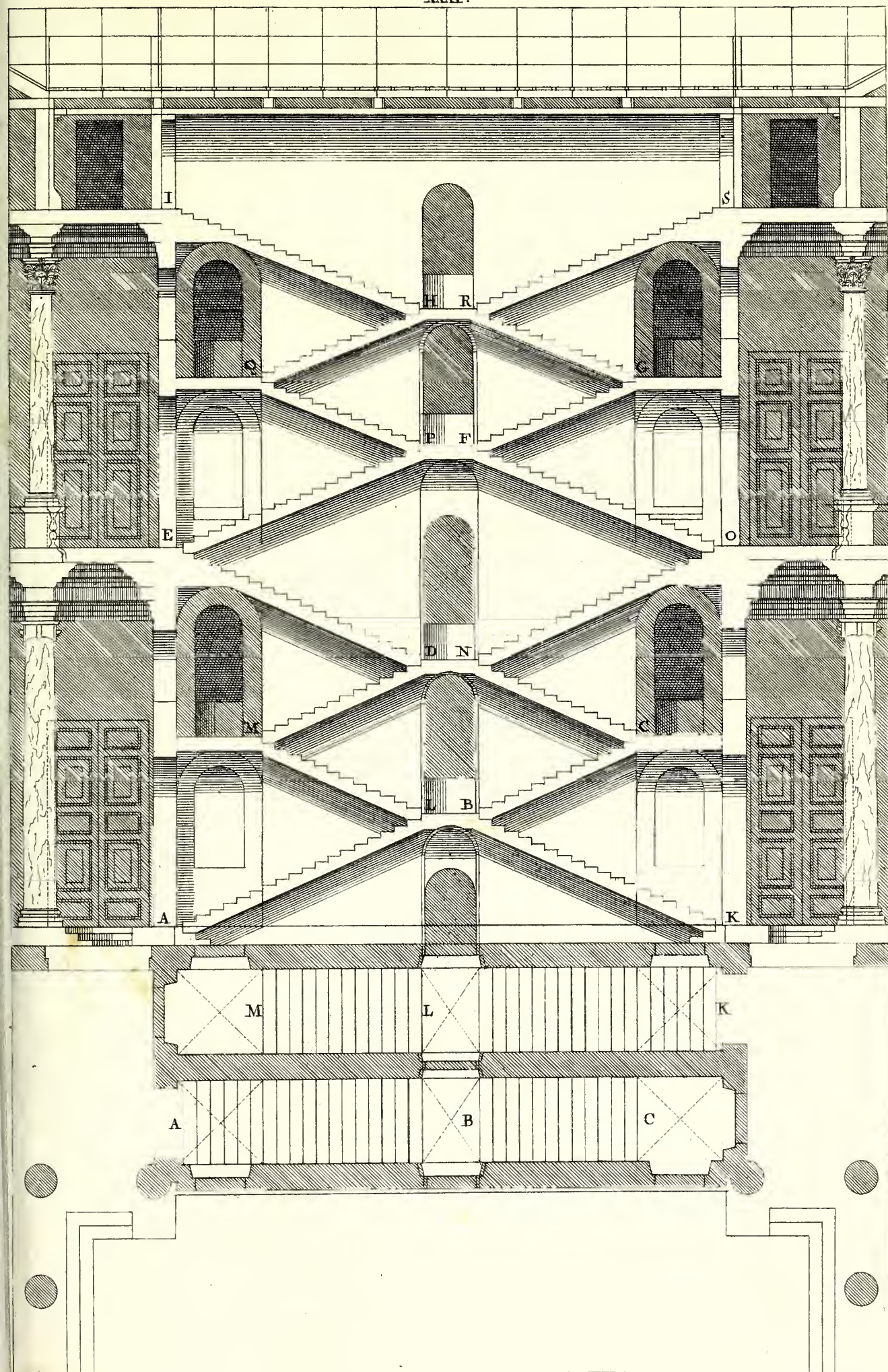
Several other sorts of *Stair-Cases* are to be seen in antient *Edifices*, as *Triangular*, of which kind are those by which we go up to the *Cupola* of *Santa Maria Rotunda*, that are open in the middle and receive the Light from above. Those of the Church of *Santo Apostolo* in the same City, near *Monte Cavallo*, are also very magnificent; these *Stair-Cases* which were double, have been imitated by several Architects; they led to a *Temple* situated at the Top of the Mountain, as I shall shew in my Book of *Temples*; and this is the last *Design* of this kind of *Stair-Cases*.

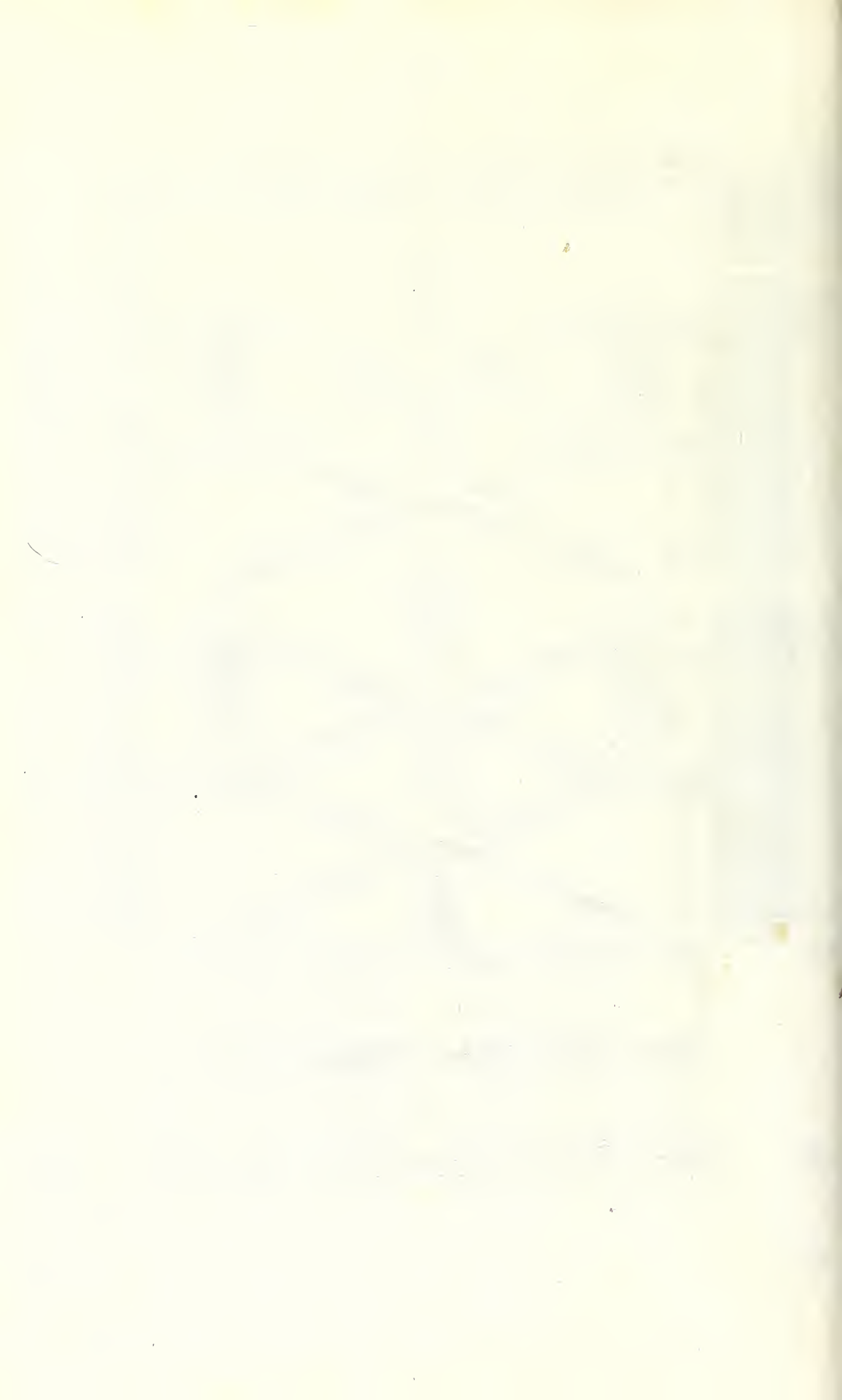
CHAP. XXIX.

Of Roofs.

HAVING carried the *Walls* as high as they are to go, made the *Vaults*, laid the *Joysts* of the *Floors*, brought up the *Stair-Cases*, and in a Word done all those Things of which we have already spoken; we are in the next place to raise the *Roof*, which as it embraces every part of the *Building*, and with its weight presses the several *Walls* equally, is by that means a kind of Band to the whole Work; and serves not only to shelter such as dwell in the House,







House, from Rain, Snow, the scorching Rays of the Sun, and the moist Vapours that rise in the Night; but is also of great advantage to the whole *Building*, by carrying off the Rain from the *Walls*, which though supposed to be but of little Prejudice to the *Building*, will nevertheless, in process of Time, be found to be very detrimental to it. *Vitruvius* tells us, that in the Infant Ages of the World, Men made the *Roofs* of their Houses flat, when afterwards finding that this did not shelter them from Rains, necessity obliged them to raise them in the middle, and make them with a Slope. These *Roofs* must be made more or less shelving, according to the Climate. Wherefore in *Germany*, by reason of the great quantity of Snow that falls there, the *Roofs* are made very acute or sharp, and are covered with *Shingles*, which are little thin Pieces of *Wood*; or else with very thin *Tiles*, for otherwise they would be crushed by the weight of the Snow. But those who live in mild and temperate Climates, should raise their *Roofs* with Beauty and Elegance, and to such a height, that the Rain may easily run off. Therefore the breadth of the Place to be roofed, must be divided into nine Parts, two of which shall be the Pitch; for if it were made of one fourth of the breadth, the *Roof* would be too acute, so that the *Tiles* would hardly cleave; and if they were made but of a fifth Part, the *Roof* would be too flat, by which Means it would be too much pressed by the super-incumbent weight of the *Tiles*, *Shingles* and *Snows*. *Gutters* are generally made round the House, into which the Water falling from the *Tiles*, is carried off by Spouts at a great distance from the *Walls*. The *Gutters* ought to have a Foot and a half of *Wall* over them, which will not only keep them in stronger, but also preserve the *Timber* in the *Roof*, from any Damage that might otherwise be occasioned by the Rains.

There are various Methods of framing the *Timber* in the *Roof*; but when the middle *Walls* support the *Joysts*, they are easily raised: I very much approve of this Method, because the outward *Walls* are thereby very little pressed, and also that in case the end of any *Joysts* should happen to rot, the *Roof* would be in no manner of Danger upon that Account.



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